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THE BIDIRECTIONAL EFFECTS OF SERIOUS CONDUCT PROBLEMS, ANXIETY, AND TRAUMA EXPOSURE: IMPLICATIONS FOR OUR UNDERSTANDING OF THE DEVELOPMENT OF CALLOUS-UNEMOTIONAL TRAITS

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Psychology

by
Emily Lynne Robertson
B.S., University of North Florida, 2014
M.S., Louisiana State University, 2018
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Emily Lynne Robertson

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Abstract

The association of anxiety and trauma with childhood conduct problems has long been the focus of research, and more recently this area of research has become critical to understanding the development of callous-unemotional (CU) traits. Research in samples of children and adolescents has indicated that those elevated on both CU traits and anxiety seem to show more severe externalizing behaviors and are more likely to show histories of trauma. These findings have typically been interpreted as being indicative of a unique casual pathway to CU traits in those high on anxiety. However, an alternative explanation is that the higher rates of anxiety and trauma exposure in some youth with elevated CU traits is largely due to their higher levels of conduct problems. The current study recruited a sample of 1,216 justice-involved adolescents (M age = 15.28, SD = 1.28) from three distinct regions of the United States and were assessed at 6 months, 12 months, 18 months, 24 months, 30 months, 36 months, 48 months, and 60 months. Using multi-panel cross-lagged and longitudinal mediation analyses, we find evidence that anxiety and victimization are largely the consequence of an adolescent's antisocial and aggressive behavior and that these externalizing problems explain the link between CU traits and increases in future anxiety and victimization. These results are consistent with a model suggesting that higher levels of externalizing behaviors result in higher levels of anxiety and victimization. Rather than being an indicator of etiological differences between primary and secondary CU variants, the presence of anxiety appears to be a marker of the severity of conduct problems in youth with CU traits. The outcomes of this study inform both theoretical work regarding the development of CU traits and applied work, such as interventions for children with serious conduct problems and CU traits.

Chapter 1. Introduction

Serious conduct problems among children and adolescents, often referred to as externalizing problems or disruptive behavior disorders, are characterized by violations of the rights of others, including aggression and violence, and significant law- and rule-breaking behavior (American Psychological Association, 2013). The most prevalent conduct related disorders include Oppositional Defiant Disorder (ODD), which is characterized by a pattern of persistent defiance, argumentativeness, irritability, anger, and vindictiveness, and Conduct Disorder (CD), which is characterized by serious rule violations (i.e., skipping school, running away), physical aggression directed toward people or animals, and law-breaking behaviors (i.e., stealing, destroying property; American Psychological Association, 2013). A meta-analytic review of prevalence rates of mental health concerns in children and adolescents found 5.7% are diagnosed with any disruptive behavior disorder, 3.6% diagnosed with ODD, and 2.1% diagnosed with CD (Polanczyk et al., 2015), although prevalence rates of ODD in the United States have been estimated to be as high as 12.6% (Merikangas et al., 2011). Notably, childhood conduct problems are the most common referral concern to pediatric mental health professionals (Connors et al., 2006), representing 57% of referrals in the United States (Comprehensive Community Mental Health Services for Children and Their Families Program, Evaluation Findings: Annual Report to Congress, 2010).

Children and adolescents with conduct problems are at risk for a variety of negative outcomes. Specifically, these youths are at risk of continued violence and criminality in adulthood (Broidy et al., 2003; Farrington, 1994; Fergusson et al., 2005; Tremblay et al., 1994); substance use (Fergusson et al., 2005; Hopfer et al., 2013); impaired social, familial, and romantic relationships (Burke et al., 2008; Chen et al., 2015; Fergusson et al., 2005; Haas et al.,

2018; Muñoz et al., 2008); school misconduct (Kim-Cohen et al., 2009); poor academic performance (Sayal et al., 2015); school dropout (Parker & Asher, 1987; Ensminger & Sluarcick, 1992; Vitaro et al., 2001; Ensminger et al., 1996); and physical health problems (Odgers et al., 2007; Odgers et al., 2008). In addition to the impairment these symptoms cause in the child and their family, they are also costly to society (Cohen et al., 2010; Foster & Jones, 2005; Kohlboeck et al., 2014). For example, in a longitudinal, cohort study of 1,037 children followed for 30 years, those with conduct problems that persisted into adulthood represented only 9% of the sample, but were responsible for 53.3% of all criminal convictions, 20.5% of prescription fills, 15.7% of emergency department visits, and 24.7% of welfare benefits (Rivenbark et al., 2018). Thus, there is a great interest in understanding developmental pathways to these conduct problems in order to better inform treatments.

Childhood Conduct Problems and Anxiety

While conduct problems are unique among childhood psychological disorders in that they are defined solely by externalizing symptoms, co-occurring or co-morbid internalizing symptoms among these youths, especially anxiety, are quite common (Boylan et al., 2007; Cunningham & Ollendick, 2010; Garland & Garland, 2001; Marmorstein, 2007; McConaughy & Skiba, 1993; Russo & Beidel, 1994). Anxiety is characterized by persistent worry, fearfulness, and physiological arousal that is difficulty to control. The presence of anxiety disorders among children with conduct problems range from 22-33% in community samples (Bowen et al., 1990; McGee et al., 1990) to 40% in clinic referred samples (Greene et al., 2002). A meta-analytic review suggests that this comorbidity has been found to be three times as likely than would be predicted by chance (Angold et al., 1999) and does not appear to be fully accounted for by methodological issues such as shared method variance or referral bias (for review see Bubier &

Drabick, 2008 and Cunningham & Ollendick, 2010). Even when assessed dimensionally, anxiety and conduct problems are positively correlated with estimates ranging from $r = .23 – .55$ (Barnow et al., 2011; Epkins & Meyers, 1994; Garland & Garland, 2001; Gifford-Smith & Rabiner, 2004; Marsee et al., 2008; Tanaka et al., 2010). This positive correlation is somewhat puzzling given that these symptoms appear counterintuitive. That is, anxiety is positively associated with excessive behavioral inhibition (Biederman et al. 1991; Grillon et al., 2017; Kagan et al., 1984; Mick & Telch, 1998; Rosenbaum et al., 1988; Rosenbaum et al., 1991), fearfulness, and shyness (van Ameringen et al., 1998), whereas childhood conduct problems are positively associated with behavioral disinhibition and fearlessness (Iacono et al., 2008; Young et al., 2009).

The association between conduct problems and anxiety has added importance because the presence of anxiety seems to be a marker of severity in youth with conduct problems (Anderson et al., 1987; Costello et al., 1996; Garai et al., 2009; Lansford et al., 2008; Ollendick et al., 1999; Walker et al., 1991). For example, 124 at-risk mother-child dyads were assessed twice 15 months apart. Compared to youths with elevated conduct problems and low levels of anxiety, youths with both elevated conduct problems and anxiety at time 1 were three times as likely to engage in risky behavior 15 months later, even after accounting for time 1 risky behavior (Garai et al., 2009). Thus, anxiety is associated with the seriousness of conduct problems. Further, there is some evidence to suggest the combination of anxiety and conduct problems make treatment for these symptoms less effective (Ferguson, 2002). Thus, it is important to understand why conduct problems and internalizing symptoms are correlated (Bubier & Drabick, 2008).

Most theories have generally focused on shared causal processes underlying these disorders, such as emotion dysregulation and impaired processing of social information (Althoff

et al., 2010; Marsee et al.., 2008; Polman et al., 2007; Wallace & Newman, 1990; Weems et al., 2001; Wilson et al., 2006). For example, both anxiety and aggression are associated with hypervigilance to threat (Reid et al., 2006; Wilson et al., 2006), reduced ability to regulate emotions in response to threat or aversive stimuli (Wilson et al., 2006), reduced ability to regulate negative interpretations of social information (Weems et al., 2001), hostile attributions of others' behavior (Reid et al., 2006), and engaging in an impulsive response style when punished (Wallace & Newman, 1990). These impairments in processing social information could increase risk for aggression, particularly reactive aggression (Marsee et al., 2008; Polman et al., 2007). For example, in a sample of 83 community-recruited youths, anxiety predicted increased reactive relational aggression, but this was mediated by errors in the interpretation of social information (e.g., catastrophizing; Marsee et al., 2008). Thus, anxiety and serious conduct problems may have similar underlying vulnerabilities (i.e., deficits in emotion regulation skills and cognitive biases) that lead to both problems in adjustment.

Childhood Conduct Problems and Trauma Exposure

Conduct problems have also been correlated with exposure to traumatic events. A traumatic event includes the experience of or threat of serious harm or injury such as psychological, physical, or sexual abuse, witnessing domestic violence, community violence, serious accidents or injuries, and natural disasters, and unfortunately, are commonly experienced by children and adolescents (Anda et al., 2006; Copeland et al., 2018; Flisher et al., 1997; McLaughlin et al., 2013; Wolfe et al., 2001). In an epidemiological study of 6,483 adolescents ages 13 to 17, 61.8% of youths reported exposure to at least one traumatic event in their lifetime with 29.1% of youths reporting exposure to one trauma, 14.1% reporting exposure to two traumas, and 18.6% reporting three or more traumas (McLaughlin et al., 2013). Trauma exposure

in childhood is associated with a host of poor outcomes including family dysfunction and instability (Copeland et al., 2018; Dong et al., 2003; Shaw & Krause, 2002), poor relationships (Capaldi & Crosby, 1997; Copeland et al., 2018; Flisher et al., 1997; Shaw & Krause, 2002; Shields et al., 1994), reduced academic performance (Ryan et al., 2018), health problems (Anda et al., 2006; D'Andrea et al., 2011; Shaw & Krause, 2002; Silverman et al., 1996; Sugaya et al., 2012; Wu et al., 2010), risky sexual behavior (Anda et al., 2006), and substance abuse (Anda et al., 2006; Khoury et al., 2010; Wu et al., 2010). Further, this risk for problems in adjustment goes beyond childhood. For example, 1,420 children and adolescents were assessed annually until age 16 and then again at age 19, 21, 25 and 30. Trauma exposure during childhood independently predicted worse physical and psychiatric health, financial security, educational attainment in adulthood, even after accounting for gender, race, childhood adversity, and childhood psychiatric diagnoses (Copeland et al., 2018).

Of most relevance to the current discussion, one problematic outcome that has also been consistently linked to childhood trauma are conduct problems (Anda et al., 2006; Attar et al., 1994; Baldry, 2007; Copeland et al., 2018; Docherty et al., 2018; Goodearl et al., 2014; Gorman-Smith et al., 2004; Kubik et al., 2019; Reitzel-Jaffe & Wolfe, 2001; Straus & Kantor, 1994; Sullivan et al., 2006; Widom, 1989; Wolfe et al., 2001). For example, in the longitudinal study described above by Copeland and colleagues (2018), trauma exposure in childhood predicted risky or criminal behavior in adulthood, even after accounting for adult trauma exposure and childhood adversity and psychiatric problems. In another study of 532 preschoolers, those exposed to parental abuse had significantly higher rates of aggressive and delinquent behavior compared to children who were not abused at home (Baldry, 2007). In yet another sample of 1,419 high-schoolers, maltreated teens were anywhere between 2.7 to 7.1 times more likely to

commit violent and nonviolent delinquency, carry a weapon, use threatening behaviors, and physically abuse a romantic partner (Wolfe et al., 2001). Thus, trauma exposure in childhood has been consistently linked with serious conduct problems across development.

Similar to causal theories on the relationship between anxiety and conduct problems, theories to explain how trauma exposure is associated with the development and exacerbation of conduct problems have also largely focused on the disruption in emotion regulation and the processing of social information (Lahey et al., 1999; Pennington & Ozonoff, 1996). Trauma exposure leads to a cascade of neurobiological and neuroendocrine changes that are initially evolutionarily protective (i.e., increase attention to threat cues), but over time are associated with impaired experience and regulation of emotion, cognitive functioning (i.e., attention), and processing of social information (Andersen et al., 2008; Busso et al., 2017; Carpenter et al., 2004; Curtis & Cicchetti, 2011; Gold et al., 2016; Heim, Mletzko et al., 2008; Heim et al., 2001; Heim, Newport et al., 2008; Heim et al., 2009; Knack et al., 2011; Lambert et al., 2017; Lambert et al., 2019; Lupien et al., 2009; McGowan et al., 2009; McLaughlin et al., 2017; Pagliaccio et al., 2015; Peverill et al., 2019; Pollak & Tolley-Schell, 2003; Shackman et al., 2016; Stein et al., 1997; Vythilingam et al., 2002). For example, in contrast to children and adolescents without histories of violence exposure, those exposed to violence do not effectively distinguish between safety and threat cues, leading them to have heightened responses in non-threatening scenarios (McLaughlin et al., 2016). This faulty interpretation of social cues in the environment, coupled with significant difficulty modulating these responses can put children at risk for angry, defensive, and aggressive behavior (Lambert et al., 2017; McLaughlin et al., 2015; McLaughlin et al., 2011; Weissman et al., 2019).

Failure to Consider Bidirectional Effects

Thus, causal theories have been developed to explain how trauma could lead to conduct problems and how anxiety and conduct problems can share important etiological processes. However, what causal theories have not adequately considered is the possibility of bidirectional effects. That is, childhood conduct problems are associated with a host of negative consequences and increases in anxiety or other internalizing symptoms which may be a reaction to these negative consequences (Burke et al., 2005; Campbell et al., 2006; Frick et al., 1999; Lahey et al., 2002; Masten et al., 2005; Moilanen et al., 2010; Nock et al. 2007; Stipek & Miles, 2008; van Lier et al., 2012). For example, in a longitudinal study of 205 children ages 8 to 12 who were followed over 20 years, childhood conduct problems predicted reduced academic performance in adolescents, which then subsequently predicted increased internalizing problems in adulthood (Masten et al., 2005).

Similarly, aggressive and antisocial children are difficult and behave in defiant and aggressive ways toward others, and this disruptive and aggressive behavior may elicit negative reactions, including aggression, from peers and parents, thereby increasing the child's level of victimization (Burke et al., 2008; Edwards et al., 2001; Fontaine et al., 2016; Ford 2002; Ford et al., 2000; Huh et al., 2006; McLaughlin et al., 2013; Pardini et al., 2008; Pouwels & Chillessen, 2012). For example, childhood conduct problems increase the odds of future parental physical abuse and the odds of being a victim of future assault, mugging, or threats (McLaughlin et al., 2013). Moreover, adolescents with conduct problems may seek out dangerous situations that also increase their chances of victimization or exposure to trauma, such as affiliating with delinquent peers or peers who engage in risky behavior (Button et al., 2007; McLaughlin et al., 2013).

Developmental Pathways to Callous-Unemotional (CU) Traits

In short, while not being the subject of extensive research, there is evidence to suggest that trauma exposure and anxiety may be a consequence of a child's aggressive and disruptive behavior. This possibility has potential importance for understanding the development of callous-unemotional (CU) traits. CU traits reflect a limited capacity for guilt, reduced empathic concern for others, reduced displays of appropriate emotion, and a lack of concern over performance in important activities (Frick et al., 2014). While CU traits are found in only 25-30% of children and adolescents with serious behavior problems (Kahn et al., 2013), they make up an important subgroup of antisocial youths because they display more persistent and severe antisocial behavior, aggression, and violent offending (Baskin-Sommers et al., 2015; McMahon et al., 2010; Saukkonen et al., 2016); engage in more premeditated and instrumental aggression (Fanti et al., 2009; Frick et al., 2003; Kruh et al., 2005; Lawing et al., 2010; Marsee & Frick, 2007); engage in behavior that causes more harm toward their victims (Lawing et al., 2010); show worse treatment outcomes (Hawes & Dadds, 2005; Kimonis et al., 2015); and their behavior problems are more stable (McMahon et al., 2010; Ray et al., 2016), compared to youths with conduct problems but low CU traits. The significance of these youths' behavior problems led these traits to be included in the most recent revisions of psychiatric classification systems for Conduct Disorder in the DSM-5 (American Psychiatric Association, 2013) and Oppositional Defiant and Conduct-dissocial Disorders in the ICD-11 (World Health Organization, 2018).

Among children and adolescents with elevated CU traits, there appear to be distinct subgroups of youths who differ based on the presence of anxiety or distress (Cecil et al., 2018; Ezpeleta et al., 2017; Fanti & Kimonis, 2017; Kahn et al., 2013; Kimonis et al., 2012; Kimonis et al., 2011; Kimonis et al., 2013; Meehan et al., 2017; Sethi et al., 2018; Tatar et al., 2012; Vaughn

et al., 2009). Youths with elevated CU traits, but low levels of anxiety or distress, are often referred to as the 'primary' variant and are characterized by emotional *hypo*reactivity, such as deficits in their ability to orient quickly to emotional stimuli (i.e., someone in distress; Kimonis et al., 2012) and show reduced amygdala activation fear or distress cues (Marsh et al., 2008; White et al., 2012). In contrast, those with both elevated CU traits and elevated anxiety or distress are often referred to as the 'secondary' variant and are associated with emotional *hyper*reactivity. The secondary variant is characterized by a heightened startle response to emotional images (Kimonis et al., 2017), higher cortisol levels (Goulter et al., 2019), and greater levels of psychopathology (Bennett & Kerig, 2014; Craig & Moretti, 2019; Gill & Stickle, 2016; Salihovic et al., 2014; Sharf et al., 2014).

One of the most consistent findings from research on CU variants is that youths with a combination of both elevated CU traits and anxiety (i.e., secondary variant) show more severe conduct problems, including higher levels of aggression and delinquency, compared to youth with elevated CU traits but low levels of anxiety (i.e., primary variant; Docherty et al., 2016; Fanti et al., 2013; Flexon, 2015; Kahn et al., 2013; Kimonis et al., 2011; Kimonis et al., 2013; Salihovic et al., 2014; Vaughn et al., 2009). For example, among a sample of both high schoolers and incarcerated adolescents, the secondary variant engaged in higher levels of aggressive and violent behavior compared to the primary variant (Docherty et al., 2016). Similarly, in samples of incarcerated adolescents, the secondary variant reported higher rates of violent offending in the one-year period prior to being incarcerated (Vaughn et al., 2009) and over a two-year period while incarcerated (Kimonis et al., 2011).

Further, the secondary variant reports significantly higher levels of trauma exposure than the primary variant, including abuse, community violence, and bullying (Docherty et al., 2016;

Docherty et al., 2018; Kahn et al., 2013; Kimonis et al., 2013; Tatar et al., 2012; Vaughn et al., 2009). For example, in a sample of 227 incarcerated teen boys, those classified as the secondary variant reported more sexual abuse than those classified as the primary variant (Kimonis et al., 2013). In a sample of 272 clinic referred youths, the secondary variant were more likely to have a history of physical and sexual abuse (Kahn et al., 2013). In yet another study using a mixed sample of nearly 800 adolescents recruited from the community and juvenile institutions, the secondary variant reported significantly higher levels of neighborhood violence and victimization (e.g., verbal bullying, mild physical aggression; Docherty et al., 2016).

The higher level of anxiety, the higher rate of trauma exposure, and the greater severity of externalizing behavior in those with both elevated CU traits and anxiety has typically been interpreted as being indicative of unique causal pathways to the development of CU traits between the two variants. That is, upon exposure to trauma, a subset of children and adolescents may have difficulty coping with the trauma and perhaps as a protective mechanism, may acquire a callous and aggressive disposition (Bennett & Kerig, 2014; Kerig & Becker, 2010; Kerig et al., 2012; Kimonis et al., 2012; Mozley et al., 2018; Porter, 1996; Skeem et al., 2007; Skeem et al., 2003). Bennet and Kerig (2014) argue that the higher levels of posttraumatic stress symptoms reported in the secondary variant may provide support for this theory. That is, theories regarding posttraumatic responding suggest people respond to trauma by either overmodulation of their emotions, such as excessive control or reduction of emotions (i.e., avoidance, numbing), or undermodulation of their emotions, such as excessive emotional hyperarousal (Bennet & Kerig, 2014; Porter, 1996). In a study of 417 detained adolescents, those categorized as the secondary variant reported higher levels of posttraumatic stress, emotional numbing, and nonacceptance of their emotions when compared to those classified as the primary variant (Bennet & Kerig, 2014).

In another study of 276 detained adolescents, posttraumatic numbering of fear and sadness mediated the relationship between trauma exposure and CU traits (Kerig et al., 2012). Thus, in most theories to explain the more severe externalizing behavior in the secondary variant, emotional dysregulation caused by exposure to trauma is theorized to contribute to both the aggressive and violent behavior and the anxiety of this group of youth with elevated CU traits (Docherty et al., 2016; Kimonis et al., 2011; Vaughn et al., 2009).

Anxiety and Trauma Exposure as a Marker of the Severity of Conduct Problems

However, the bidirectional relationship between conduct problems and anxiety leads to the possibility of an alternative explanation for the appearance of CU variants as well. That is, theories of the secondary CU variant have not considered the possibility that the serious and persistent aggression associated with CU traits likely increases their odds of trauma exposure, conflict at school, as well as impairment in their relationships with peers and their family (Haas et al., 2018; Waller et al., 2016), all of which may lead to an increase in anxiety. Again, as described above for children and adolescents with a combination of anxiety and conduct problems, anxiety may be a marker of severity of behavior problems within those high on CU traits. Put simply, anxiety and trauma exposure in some youths with elevated CU traits may be due to the severity of their conduct problems, and not indicative of a unique causal pathway.

Notably, there is limited longitudinal research testing bidirectional effects of internalizing symptoms, externalizing symptoms, and trauma exposure on the development of CU variants. However, in a recent study by Fanti and colleagues (2019), the bidirectional relationships between anxiety, depression, and conduct problems were assessed in over 2,000 children ages 3-5 and followed for five years. Using autoregressive cross-lagged models, conduct problems at age 3-5 predicted depression at age 4-6, and conduct problems at ages 5-7 predicted anxiety at

ages 8-10. Importantly, both anxiety and depression did not predict future conduct problems. However, this study did not measure and include either trauma exposure or CU traits, limiting the implication of the results for theories of CU variants.

Statement of the Problem

In summary, there has been substantial debate over how to explain the correlation between anxiety and externalizing symptoms (including aggression) and between trauma exposure and externalizing symptoms among children and adolescents. Theories have generally attempted to explain the correlation with anxiety as being due to shared causal processes, such as problems regulating emotions. Theories have generally attempted to explain the correlation with trauma similarly by proposing that trauma can lead to problems in emotional regulation that can result in both anxiety and aggression. However, an alternative explanation that has not been adequately tested is the possibility that both anxiety and trauma develop as a result of externalizing behaviors. That is, externalizing problems lead to a number of problems in adjustment (e.g., peer rejection; conflict with parents, teachers, and the legal system; poor school performance) which can result in distress in the person showing these behavior problems. Similarly, children and adolescents who are more aggressive can elicit aggression from others, increasing their level of victimization.

This potential for bidirectional effects between externalizing problems and anxiety and between externalizing problems and trauma have potentially important implications for understanding the development of CU traits. CU traits are found in a subset of adolescents with serious conduct problems and these adolescents display more persistent and severe antisocial behavior and aggression. Some children with CU traits also show significant levels of anxiety (i.e., secondary variant) and research has suggested that this group shows more severe

externalizing behaviors and are more likely to show histories of trauma, compared to children and adolescents with elevated CU traits, but normative or low levels of anxiety (i.e., primary variant). These findings have typically been interpreted as being indicative of a unique causal pathway to CU traits in those high on anxiety related to problems regulating emotions. As noted above, both the anxiety and trauma may result from the serious conduct problems shown by youth with elevated CU traits. However, this possibility has not been tested to date.

Thus, the current study began to disentangle the associations among CU traits, anxiety, externalizing behaviors (e.g., aggression, antisocial behavior), and trauma exposure (e.g., victimization). Namely, we tested the predictions from a theory proposing that anxiety and victimization are largely the consequence of an adolescent's antisocial and aggressive behavior and that these externalizing problems explained the link between CU traits with both anxiety and victimization. Using a longitudinal design in a sample of adolescents who likely show high rates of CU traits and aggression (i.e., adolescents who have been arrested at least once), we tested the following hypotheses:

1. Antisocial behavior and aggression will predict increases in future anxiety and victimization across repeated assessments over a 60-month follow-up period, and this association will be stronger than anxiety and victimization predicting increases in antisocial behavior and aggression.
2. CU traits will predict increases in future anxiety and victimization across the follow-up period, and this association will be stronger than anxiety or victimization predicting increases in future CU traits.

3. The relationship between CU traits predicting future anxiety and victimization will be accounted for by the adolescents' level of antisocial behavior and aggression across the follow-up period.

Chapter 2. Method

Participants

The sample was 1,216 male first-time juvenile offenders from the Crossroads Study, an ongoing longitudinal study in Orange County, CA (n = 532), Jefferson Parish, LA (n = 151), and Philadelphia, PA (n = 533). Participants were eligible for the Crossroads Study if they were English speakers, were arrested for an eligible offense of low to moderate severity and were between the ages of 13 and 17 at the time of their first arrest. At the start of the study, the mean age of participants was 15.29 (SD = 1.29). The sample was primarily Hispanic (45.9%) and African American (36.9%) with a smaller proportion identifying as Caucasian (14.8%) and Other (2.5%). The highest level of education either parent obtained was primarily GED or high school (34.1%), less than high school (27.2%), trade school or some college (20.4%), 4-year college degree (13.5%), and graduate level education (4.8%). Participants' intelligence was on average lower than that of the general population (M = 88.50, SD = 11.87) as measured using the matrix reasoning and vocabulary sub-tests of the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999), although similar to other juvenile samples. One participant was found to be ineligible and thus, the final sample size was 1,215.

Procedures

The Institutional Review Board at all three institutions (i.e., Louisiana State University, University of California, Irvine, and Temple University) approved the study procedures. Parental informed consent and youth assent were obtained for all participants at the time of each assessment period (i.e., baseline and follow up points), until the participant turned 18 at which point consent was subsequently received at each time point with only the participant. Participants and their parents were informed that participation was entirely voluntary, would not

influence the youth's relationship with the juvenile justice system, and that they were able to withdraw from the study at any time without penalty. The youth and parents were also informed that the research project had obtained a Privacy Certificate from the Department of Justice, which protected their data from being subpoenaed for use in legal proceedings.

Participants completed the baseline assessment within six weeks of the disposition date for their first arrest and were re-assessed every six months for 36 months and then again at 48 and 60 months (9 time points across 5 years). Interviews lasted on average approximately 2-3 hours and were administered using a secure computer-based program on a laptop. Participants were able to select their preferred location to complete the interviews, often at their home, a local restaurant, public library, at the respective research team's university, or in a secure facility if they were incarcerated at the time of a follow-up interview. Finally, if participants moved too far to conduct in person interviews, phone interviews were completed (<5% of all interviews). Participants were paid $50 for the baseline interview and the payment increased by $15 for each subsequent interview (i.e., $65 for the second interview, $80 for the third interview). Retention rates were 95.7% at 6-months, 93.8% at 12-months, 93.6% at 18-months, 92.9% at 24-months, 92.1% at 30-months, 90.6% at 36-months, 86.6% at 48-months, and 84.4% at 60-months.

Measures

Callous-Unemotional (CU) Traits. CU traits were assessed at baseline, 6-month, 12-month, 18-month, 24-month, 30-month, 36-month, 48-month, and 60-month follow up time points using the self-report version of the Inventory of Callous-Unemotional traits (ICU; Kimonis et al., 2008). The ICU is a 24-item instrument that utilizes a four-point Likert scale (i.e., 0 "Not at all true" to 3 "Definitely true") to indicate how accurate each statement describes them. The scale contains equal numbers of items worded in the callous (e.g., "I do not feel remorseful

when I do something wrong*"*) and non-callous (e.g., "I am concerned about the feelings of others*"*) direction, and the non-callous items are recoded so that higher scores indicate higher levels of CU traits. Total ICU scores have been consistently positively associated with antisocial behavior and negatively associated with empathy and prosocial behavior across a range of adolescent samples (Cardinale & Marsh, 2020).

Aggression. Physical aggression was measured at baseline, 6-month, 12-month, 18-month, 24-month, 30-month, 36-month, 48-month, and 60-month follow up time points using the Peer Conflict Scale (PCS; Marsee et al., 2011), a 40-item scale designed to provide extensive coverage of aggression expressed physically (i.e., intentional physical harm to others) and relationally (i.e., intentional harm to others social relationships). Only the physical aggression items are used in the current study, with 10 items assessing reactive physical aggression and 10 items assessing proactive physical aggression. Items are rated on a four-point Likert scale (i.e., 0 "Not at all true" to 3 "Definitely true") and scores on the PCS have been associated with a laboratory measure of aggressive behavior in detained adolescent boys (Muñoz et al., 2008) and has been shown to be associated with self-reported delinquency in past samples of adolescents (Marsee et al., 2014). Total physical aggression scores were created by summing the aggression items at each time point.

Antisocial Behavior. Antisocial behavior was measured at baseline, 6-month, 12-month, 18-month, 24-month, 30-month, 36-month, 48-month, and 60-month follow up time points using the Self-Report Offending (SRO; Huizinga et al., 1991), a 22-item scale that assess drug, property, and violent crimes. Sample items include "sold marijuana", "sold other drugs", "shoplifting", "robbery", "been in a fight", "forced someone to have sex with you", "shot at someone (where you pulled the trigger)", and "killed someone". Scores on this scale have been

shown to correlate with other measures of aggression and official records of offending across diverse samples (Farrington et al., 1996; Thornberry & Krohn, 2000). Each item asked participants (yes = 1 or no = 0) if, in the last 6 months, they engaged in each crime, and if yes, how many times. At baseline, each item asked participants if they had ever in their life engaged in each crime. The SRO variety score was calculated to evaluate the number of different crimes (i.e., offense types) endorsed over each assessment period. This method is often preferred over a frequency score because the variety score is less prone to recall errors and does not lead to less severe, but more frequent, items determining the total score (Thornberry & Krohn, 2000). Higher scores represent a greater variety of crimes committed and are correlated with measures of seriousness and frequency of antisocial behavior (Monahan & Piquero, 2009).

Anxiety. Participants' trait anxiety was measured at baseline, 6-month, 12-month, 18-month, 24-month, 30-month, 36-month, 48-month, and 60-month follow up time points using the 6-items from the generalized anxiety disorder (GAD) subscale of the Revised Children Anxiety and Depression Scale (RCADS; Chorpita et al., 2000). The items are rated on a four-point Likert scale (i.e., 0 "Never" to 3 "Always"). The six items included in this subscale include: "I worry about things", "I worry that something awful will happen to someone in my family", "I worry that bad things will happen to me", "I worry that something bad will happen to me", "I worry about what is going to happen", and "I think about death". Only the GAD subscale was used from the RCADS, as the items all focus on generalized worry and thus, they capture trait anxiety consistent with past work studying secondary variants of CU (Gill & Stickle, 2016). Further, this subscale has shown convergent validity with other measures of trait anxiety in both community and clinical samples of adolescents (Chorpita et al., 2005; Chorpita et al., 2000).

Victimization. Victimization was measured at baseline, 6-month, 12-month, 18-month, 24-month, 30-month, 36-month, 48-month, and 60-month follow up time points using the Exposure to Violence (ETV) scale, a 13 item, self-report measure which asks whether participants were victimized by different types of violence or witnessed someone else victimized since the last interview (e.g., "Have you been attacked with a weapon, like a knife, box cutter, or bat?", "Been chased where you thought you might be seriously hurt?"; Selner-Ohagan et al., 1998). Scores on this scale have been associated with increased self-report offending (Selner-Ohagan et al., 1998) and post-traumatic stress symptoms in at-risk adolescents (Muller et al., 2000). Although the ETV also includes items assessing the youth's witness of violence toward others, these items will not be used for the purposes of the current study. Total victimization scores were created by summing the number of violent victimizations endorsed within each time point.

Baseline Control Variables

To assess demographic control variables, participants self-reported their **age** and **race/ethnicity**. Race/ethnicity was dichotomized such that endorsement of the ethnicity/race was coded as a 1 and no endorsement was coded as 0 (i.e., 1 – African American, 0 – Not African American, 1 – Hispanic, 0 – Not Hispanic). **Intelligence** was measured at baseline (M = 88.43, SD = 11.59) using the matrix reasoning and vocabulary sub-tests of the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999).

Analytic Plan

All variables had some missing data. Missing data ranged from .1% (n = 1) to 15.6% (n = 190) on individual measures and resulted in a total of 6.4% of all values missing. Missing data were imputed using maximize estimation within SPSS 26.

First, zero-order correlations between demographic and main study variables were calculated, prior to the multivariate analyses testing the study hypotheses. Second, to test hypotheses one and two, a series of multiple panel cross-lagged path models (Bollen and Curran 2006; Selig & Little, 2012) were then constructed within *MPlus 8* to examine the longitudinal associations among our main study variables using baseline, year 1, year 2, year 3, year 4, and year 5 data. Autoregressive cross-lagged path models allow researchers to assess the relationship between variables across time such that change in variables across occasions are accounted for by regressing each repeatedly assessed variable (e.g., Anxiety2) on its immediate prior value (e.g., Anxiety1) which signify the stability paths, or continuity within variables across time points. Additionally, the models simultaneously use cross-lagged, across-time, paths such that variable X at time 1 (e.g., Antisocial behavior 1) predicts variable Y at time 2 (e.g., Anxiety 2), while controlling for the prior level of the construct being predicted, Variable Y at time 1 (e.g., Anxiety 1). Further, within time correlated errors between the variables were modeled. Because the prior levels of the outcome variable are controlled for, we are able to rule out the possibility that cross-lagged effects are due to the fact that X and Y are correlated at each time point (Selig & Little, 2012). Finally, a multiple panel approach was used, in which models tested cross-lagged associated within each year increment separately (i.e., separate panels).

Following suggestions for assessing model fit of cross-lagged models, four nested models were constructed within each panel. Specifically, a model with no cross-lagged paths (i.e., stability coefficients and within time correlations only), a model with cross-lagged paths from variable X predicting variable Y, a model with cross-lagged paths from variable Y predicting variable X, and a model with both sets of cross-lagged paths were all estimated. Chi-square difference tests were then conducted to determine the best fitting model for each panel within

each of the 6 cross-lagged models. Model fit was further assessed using the root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), comparative fit index (CFI), and the Tucker-Lewis index (TLI; Hu & Bentler, 1999; Bollen & Curran, 2006). RMSEA values lower than .08, SRMR values lower than .10, and CFI and TLI values above .90 represent acceptable model fit (Hu & Bentler, 1999). All models included participant age at first arrest, race/ethnicity, and IQ. To minimize the Type 1 error rate, Bonferroni correction was used to adjust for family wise error leading to a significant level of $p < .013$.

To assess the first hypothesis that antisocial behavior and aggression would more strongly predict increases in future anxiety and victimization than anxiety and victimization would predict increases in future antisocial behavior and aggression, four multiple panel cross-lagged models were estimated (i.e., aggression and anxiety, antisocial behavior and anxiety, aggression and victimization, and antisocial behavior and victimization). To assess the second hypothesis that CU traits would more strongly predict increases in future anxiety and victimization than anxiety and victimization would predict increases in future CU traits, two additional multiple panel cross-lagged models were estimated (i.e., CU traits and anxiety, CU traits and victimization).

Finally, to test the third hypothesis that the relationship between CU traits and future anxiety and victimization would be accounted for by the adolescents' level of antisocial behavior and aggression, a series of longitudinal parallel mediation models were estimated using SPSS PROCESS. All models included CU traits as the predictor variable, both aggression and antisocial behavior as parallel mediators, and either anxiety or victimization as the outcome variable. To be similar to the multi-panel cross-lagged analyses, mediation was tested in yearly increments but for these analyses, we used data from the intermediate points to assess the

mediators. That is, we tested if baseline CU traits' prediction of anxiety at one year was mediated by aggression and antisocial behavior assessed at 6 months. Similarly, we tested if year 1 CU traits' prediction of year 2 anxiety was mediated by aggression and antisocial behavior at 18 months. Given that follow-ups went to a yearly basis after year 3, we tested whether year 3 CU traits relationship with year 5 anxiety/victimization was mediated by year 4 aggression and antisocial behavior. Indirect effects were only calculated for models in which there was a significant direct effect. Standard errors and bias-corrected bootstrapped confidence intervals for indirect effects were based on 5,000 bootstrap resamples. All mediation models included age, IQ, race, and prior levels of the dependent variable.

Chapter 3. Results

Preliminary Analyses

Zero-order correlations among demographic and main study variables are reported in Table 1. First, in terms of demographic variables, age was positively correlated with baseline antisocial behavior, baseline anxiety, and baseline victimization. Race was related to antisocial behavior, anxiety, and victimization, such that being African American was related to less antisocial behavior at baseline and across the follow-up periods, as well as less victimization and anxiety at baseline and across most of the follow-up periods. In contrast, being Hispanic was unrelated to antisocial behavior at baseline but related to antisocial behavior at the majority of the follow up periods. Further, being Hispanic was related to victimization and anxiety at baseline and across many of the follow up periods. Further, IQ was positively correlated with baseline antisocial behavior and negatively correlated with CU traits across all follow up points. Second, baseline CU traits was positively correlated with antisocial behavior, aggression, anxiety, and victimization across all follow up periods.

Table 1. Zero-Order Correlations among Demographic Variables and Main Study Variables.

	1	2	3	4	5	6	7	8	9	10	11
1. Age	1										
2. IQ	.06*	1									
3. Black	-.10**	-.14**	1								
4. Hispanic	.03	-.07*	-.70**	1							
5. Aggression - Baseline	.01	-.05	.07*	-.05	1						
6. Aggression - 6 Months	-.04	-.05	.02	-.02	.62**	1					
7. Aggression - 12 Months	-.06*	-.05	.03	-.04	.61**	.65**	1				
8. Aggression - 18 Months	-.05	-.05	.05	-.05	.53**	.60**	.64**	1			
9. Aggression - 24 Months	-.10**	-.04	.06	-.05	.52**	.54**	.64**	.68**	1		
10. Aggression - 30 Months	-.08**	-.05	.04	-.03	.41**	.45**	.54**	.59**	.67**	1	
11. Aggression - 36 Months	-.09**	-.06	.06*	-.07*	.44**	.53**	.56**	.57**	.62**	.60**	1
12. Aggression - 48 Months	-.06*	-.01	.09**	-.09**	.39**	.49**	.52**	.50**	.55**	.51**	.56**
13. Aggression - 60 Months	-.08**	-.05	.08**	-.10**	.42**	.46**	.47**	.48**	.55**	.57**	.53**
14. Antisocial Behavior - Baseline	.20**	.08**	-.10**	.05	.47**	.30**	.29**	.30**	.25**	.22**	.21**
15. Antisocial Behavior – 6 Months	.05	.02	-.09**	.07**	.36**	.46**	.39**	.34**	.29**	.31**	.28**
16. Antisocial Behavior - 12 Months	.02	.02	-.07*	.04	.33**	.32**	.46**	.35**	.33**	.32**	.30**
17. Antisocial Behavior - 18 Months	-.03	.00	-.07*	.08**	.21**	.26**	.30**	.38**	.31**	.29**	.26**
18. Antisocial Behavior - 24 Months	-.01	.01	-.08**	.06*	.22**	.25**	.32**	.35**	.39**	.30**	.32**
19. Antisocial Behavior - 30 Months	-.01	.02	-.07**	.06*	.24**	.25**	.28**	.30**	.32**	.34**	.36**
20. Antisocial Behavior - 36 Months	-.01	.03	-.07*	.04	.20**	.21**	.24**	.27**	.29**	.31**	.35**
21. Antisocial Behavior - 48 Months	-.01	-.01	-.06*	.03	.23**	.25**	.30**	.24**	.27**	.26**	.30**
22.Antisocia l Behavior - 60 Months	-.01	.04	-.03	.00	.25**	.25**	.29**	.27**	.31**	.31**	.29**
23. CU Traits - Baseline	-.02	-.07*	-.08**	.11**	.40**	.35**	.32**	.30**	.25**	.23**	.25**
24. CU Traits - 6 Months	-.05	-.10**	-.04	.07*	.29**	.40**	.31**	.28**	.26**	.21**	.24**
25. CU Traits - 12 Months	-.12**	-.09**	.00	.03	.28**	.34**	.38**	.31**	.29**	.26**	.27**
26.CU Traits - 18 Months	-.12**	-.11**	.01	.03	.27**	.30**	.31**	.38**	.31**	.32**	.27**
27. CU Traits - 24 Months	-.12**	-.11**	.04	.04	.26**	.31**	.33**	.34**	.34**	.31**	.29**
28. CU Traits - 30 Months	-.17**	-.12**	.06*	.00	.23**	.28**	.30**	.32**	.32**	.38**	.31**
29. CU Traits - 36 Months	-.16**	-.12**	.06	.02	.24**	.28**	.31**	.33**	.31**	.28**	.38**
30. CU Traits - 48 Months	-.13**	-.11**	.10**	-.03	.22**	.26**	.26**	.29**	.28**	.26**	.29**
31. CU Traits - 60 Months	-.13**	-.10**	.07*	.01	.21**	.22**	.21**	.24**	.26**	.25**	.25**
32. Anxiety - Baseline	.09**	.02	-.08**	.11**	.24**	.21**	.13**	.15**	.13**	.13**	.09**
33. Anxiety - 6 Months	.11**	-.02	-.03	.05	.26**	.32**	.23**	.23**	.18**	.21**	.20**
34. Anxiety - 12 Months	.06*	-.01	-.05	.03	.27**	.27**	.30**	.27**	.22**	.22**	.21**
35. Anxiety - 18 Months	.05	.02	-.08**	.06	.27**	.28**	.25**	.31**	.25**	.24**	.23**

Note: Black and Hispanic are coded 1 for endorsing the race/ethnicity and 0 for all other individuals.

	1	2	3	4	5	6	7	8	9	10	11
36. Anxiety - 24 Months	.01	.01	-.05	.03	.23**	.25**	.2*8*	.29**	.25**	.31**	.34**
37. Anxiety - 30 Months	.02	.05	-.02	.02	.17**	.20**	.20**	.20**	.19**	.22**	.20**
38. Anxiety - 36 Months	-.06*	.05	-.01	-.01	.18**	.22**	.21**	.20**	.21**	.22**	.18**
39. Anxiety - 48 Months	.13**	.05	-.09**	.06*	.34**	.27**	.21**	.21**	.17**	.16**	.15**
40. Anxiety - 60 Months	.05	.00	-.09**	.08**	.19**	.28**	.19**	.17**	.15**	.19**	.17**
41. Victimization - Baseline	-.01	-.02	-.11**	.12**	.15**	.17**	.27**	.22**	.19**	.20**	.11**
42. Victimization - 6 Months	.00	-.01	-.07*	.08**	.13**	.15**	.16**	.23**	.17**	.16**	.10**
43. Victimization - 12 Months	.00	.03	-.08**	.07*	.12**	.14**	.16**	.18**	.25**	.17**	.15**
44. Victimization - 18 Months	.03	.04	-.07*	.04	.13**	.17**	.16**	.20**	.17**	.21**	.17**
45. Victimization - 24 Months	.02	-.01	-.04	.03	.11**	.13**	.14**	.18**	.23**	.23**	.21**
46. Victimization - 30 Months	-.01	.01	-.07*	.06*	.09**	.11**	.13**	.14**	.13**	.16**	.15**
47. Victimization - 36 Months	.00	.00	-.01	.01	.14**	.16**	.16**	.16**	.17**	.17**	.11**
48. Victimization - 48 Months	.01	.01	-.05	.03	.23**	.25**	.28**	.29**	.25**	.31**	.34**
49. Victimization - 60 Months	.02	.05	-.02	.02	.17**	.20**	.20**	.20**	.19**	.22**	.20**

(Table cont'd). Note*:* Black and Hispanic are coded 1 for endorsing the race/ethnicity and 0 for all other individuals.

	12	13	14	15	16	17	18	19	20	21	22
1. Age											
2. IQ											
3. Black											
4. Hispanic											
5. Aggression - Baseline											
6. Aggression - 6 Months											
7. Aggression - 12 Months											
8. Aggression - 18 Months											
9. Aggression - 24 Months											
10. Aggression - 30 Months											
11. Aggression - 36 Months											
12. Aggression - 48 Months	1										
13. Aggression - 60 Months	.62**	1									
14. Antisocial Behavior - Baseline	.18**	.16**	1								
15. Antisocial Behavior - 6 Months	.26**	.26**	.56**	1							
16. Antisocial Behavior - 12 Months	.30**	.30**	.47**	.61**	1						
17. Antisocial Behavior - 18 Months	.23**	.25**	.32**	.43**	.61**	1					
18. Antisocial Behavior - 24 Months	.25**	.28**	.34**	.43**	.54**	.63**	1				
19. Antisocial Behavior - 30 Months	.25**	.32**	.29**	.36**	.47**	.53**	.64**	1			
20. Antisocial Behavior - 36 Months	.26**	.31**	.27**	.33**	.40**	.44**	.53**	.62**	1		
21. Antisocial Behavior - 48 Months	.43**	.37**	.29**	.36**	.42**	.35**	.39**	.45**	.50**	1	
22.Antisocia l Behavior - 60 Months	.37**	.49**	.27**	.32**	.38**	.36**	.38**	.43**	.42**	.62**	1
23. CU Traits - Baseline	.22**	.23**	.35**	.34**	.29**	.19**	.20**	.21**	.16**	.18**	.19**
24. CU Traits - 6 Months	.23**	.24**	.23**	.32**	.27**	.21**	.21**	.20**	.18**	.20**	.18**
25. CU Traits - 12 Months	.23**	.24**	.22**	.30**	.30**	.23**	.20**	.20**	.14**	.18**	.16**
26.CU Traits - 18 Months	.22**	.27**	.18**	.26**	.23**	.25**	.21**	.22**	.18**	.16**	.18**
27. CU Traits - 24 Months	.24**	.28**	.16**	.24**	.21**	.21**	.20**	.20**	.17**	.13**	.13**
28. CU Traits - 30 Months	.27**	.29**	.11**	.20**	.20**	.20**	.16**	.22**	.21**	.19**	.17**
29. CU Traits - 36 Months	.28**	.29**	.09**	.19**	.20**	.19**	.18**	.22**	.22**	.17**	.16**
30. CU Traits - 48 Months	.33**	.29**	.10**	.14**	.16**	.16**	.12**	.18**	.19**	.20**	.19**
31. CU Traits - 60 Months	.26**	.36**	.10**	.14**	.13**	.15**	.12**	.19**	.16**	.19**	.24**
32. Anxiety - Baseline	.09**	.09**	.23**	.19**	.13**	.09**	.09**	.13**	.07**	.11**	.09**
33. Anxiety - 6 Months	.18**	.15**	.23**	.27**	.18**	.14**	.11**	.11**	.10**	.12**	.12**
34. Anxiety - 12 Months	.18**	.19**	.22**	.26**	.26**	.18**	.18**	.17**	.17**	.21**	.19**
35. Anxiety - 18 Months	.21**	.22**	.22**	.25**	.25**	.23**	.20**	.21**	.16**	.18**	.17**

(Table cont'd). Note: Black and Hispanic are coded 1 for endorsing the race/ethnicity and 0 for all other individuals.

	12	13	14	15	16	17	18	19	20	21	22
36. Anxiety - 24 Months	.21**	.22**	.20**	.24**	.22**	.25**	.28**	.22**	.18**	.17**	.20**
37. Anxiety - 30 Months	.23**	.24**	.17**	.21**	.21**	.20**	.22**	.25**	.21**	.20**	.19**
38. Anxiety - 36 Months	.22**	.22**	.15**	.22**	.22**	.20**	.24**	.23**	.23**	.18**	.18**
39. Anxiety - 48 Months	.30**	.23**	.16**	.20**	.21**	.16**	.16**	.16**	.15**	.28**	.19**
40. Anxiety - 60 Months	.21**	.29**	.12**	.18**	.14**	.13**	.15**	.16**	.18**	.20**	.23**
41. Victimization - Baseline	.16**	.12**	.55**	.40**	.32**	.23**	.25**	.25**	.25**	.25**	.18**
42. Victimization - 6 Months	.15**	.14**	.31**	.49**	.35**	.26**	.28**	.28**	.24**	.22**	.23**
43. Victimization - 12 Months	.18**	.19**	.22**	.31**	.54**	.39**	.36**	.32**	.30**	.26**	.27**
44. Victimization - 18 Months	.12**	.16**	.15**	.20**	.37**	.55**	.38**	.32**	.29**	.20**	.22**
45. Victimization - 24 Months	.13**	.14**	.20**	.24**	.31**	.34**	.59**	.38**	.33**	.22**	.21**
46. Victimization - 30 Months	.18**	.20**	.17**	.19**	.26**	.32**	.35**	.50**	.33**	.25**	.21**
47. Victimization - 36 Months	.17**	.20**	.16**	.20**	.22**	.23**	.33**	.31**	.51**	.26**	.25**
48. Victimization - 48 Months	.27**	.21**	.14**	.18**	.26**	.25**	.23**	.30**	.27**	.50**	.31**
49. Victimization - 60 Months	.18**	.27**	.15**	.18**	.26**	.19**	.17**	.24**	.27**	.25**	.39**

(Table cont'd). Note*:* Black and Hispanic are coded 1 for endorsing the race/ethnicity and 0 for all other individuals.

	23	24	25	26	27	28	29	30	31	32	33
1. Age											
2. IQ											
3. Black											
4. Hispanic											
5. Aggression - Baseline											
6. Aggression - 6 Months											
7. Aggression - 12 Months											
8. Aggression - 18 Months											
9. Aggression - 24 Months											
10. Aggression - 30 Months											
11. Aggression - 36 Months											
12. Aggression - 48 Months											
13. Aggression - 60 Months											
14. Antisocial Behavior - Baseline											
15. Antisocial Behavior - 6 Months											
16. Antisocial Behavior - 12 Months											
17. Antisocial Behavior - 18 Months											
18. Antisocial Behavior - 24 Months											
19. Antisocial Behavior - 30 Months											
20. Antisocial Behavior - 36 Months											
21. Antisocial Behavior - 48 Months											
22.Antisocia l Behavior - 60 Months											
23. CU Traits - Baseline	1										
24. CU Traits - 6 Months	.64**	1									
25. CU Traits - 12 Months	.57**	.67**	1								
26.CU Traits - 18 Months	.52**	.62**	.68**	1							
27. CU Traits - 24 Months	.49**	.58**	.63**	.68**	1						
28. CU Traits - 30 Months	.43**	.55**	.60**	.64**	.71**	1					
29. CU Traits - 36 Months	.46**	.55**	.56**	.61**	.67**	.70**	1				
30. CU Traits - 48 Months	.40**	.48**	.53**	.56**	.59**	.63**	.66**	1			
31. CU Traits - 60 Months	.37**	.43**	.48**	.55**	.54**	.56**	.58**	.64**	1		
32. Anxiety - Baseline	.08**	.08**	.04	.07*	.06*	.06*	.05	.04	.04	1	
33. Anxiety - 6 Months	.14**	.16**	.12**	.11**	.14**	.13**	.12**	.10**	.09**	.54**	1
34. Anxiety - 12 Months	.17**	.19**	.18**	.17**	.16**	.15**	.14**	.10**	.12**	.47**	.56**
35. Anxiety - 18 Months	.16**	.15**	.15**	.16**	.17**	.19**	.14**	.11**	.11**	.47**	.52**

(Table cont'd). Note: Black and Hispanic are coded 1 for endorsing the race/ethnicity and 0 for all other individuals.

	23	24	25	26	27	28	29	30	31	32	33
36. Anxiety - 24 Months	.17**	.17**	.15**	.17**	.17**	.18**	.18**	.13**	.11**	.44**	.48**
37. Anxiety - 30 Months	.16**	.16**	.15**	.19**	.20**	.21**	.19**	.16**	.17**	.35**	.49**
38. Anxiety - 36 Months	.13**	.13**	.13**	.18**	.17**	.18**	.19**	.13**	.11**	.38**	.43**
39. Anxiety - 48 Months	.10**	.15**	.12**	.13**	.14**	.18**	.15**	.20**	.14**	.39**	.41**
40. Anxiety - 60 Months	.08**	.10**	.09**	.12**	.11**	.15**	.13**	.12**	.18**	.34**	.37**
41. Victimization - Baseline	.20**	.14**	.11**	.08**	.08**	.05	.06	.09**	.07*	.26**	.21**
42. Victimization - 6 Months	.14**	.13**	.10**	.09**	.19**	.07*	.07*	.06	.03	.14**	.23**
43. Victimization - 12 Months	.12**	.11**	.12**	.11**	.10**	.11**	.08**	.07*	.05	.11**	.14**
44. Victimization - 18 Months	.09**	.11**	.11**	.12**	.10**	.08**	.04	.09**	.07*	.10**	.11**
45. Victimization - 24 Months	.09**	.09**	.11**	.10**	.10**	.06*	.07*	.07*	.06*	.08**	.11**
46. Victimization - 30 Months	.12**	.12**	.10**	.12**	.14**	.13**	.14**	.12**	.12**	.11**	.09**
47. Victimization - 36 Months	.07*	.10**	.06	.10**	.10**	.13**	.09**	.12**	.09**	.06*	.04
48. Victimization - 48 Months	.09**	.10**	.09**	.10**	.09**	.13**	.09**	.14**	.13**	.09**	.09**
49. Victimization - 60 Months	.05	.08**	.04	.07*	.06	.08**	.03	.07*	.12**	.08**	.07*

(Table cont'd). Note: Black and Hispanic are coded 1 for endorsing the race/ethnicity and 0 for all other individuals.

	34	35	36	37	38	39	40	41	42	43	44
34. Anxiety - 12 Months	1										
35. Anxiety - 18 Months	.60**	1									
36. Anxiety - 24 Months	.54**	.59**	1								
37. Anxiety - 30 Months	.54**	.55**	.60**	1							
38. Anxiety - 36 Months	.47**	.48**	.56**	.60**	1						
39. Anxiety - 48 Months	.43**	.47**	.48**	.54**	.51**	1					
40. Anxiety - 60 Months	.43**	.42**	.45**	.51**	.46**	.53**	1				
41. Victimization - Baseline	.25**	.20**	.21**	.18**	.16**	.15**	.15**	1			
42. Victimization - 6 Months	.19**	.19**	.20**	.17**	.17**	.12**	.15**	.41**	1		
43. Victimization - 12 Months	.22**	.17**	.14**	.14**	.14**	.14**	.13**	.32**	.40**	1	
44. Victimization - 18 Months	.17**	.22**	.20**	.18**	.14**	.13**	.11**	.24**	.31**	.40**	1
45. Victimization - 24 Months	.15**	.16**	.23**	.18**	.19**	.15**	.14**	.23**	.29**	.30**	.35**
46. Victimization - 30 Months	.11**	.14**	.19**	.21**	.19**	.20**	.12**	.17**	.17**	.21**	.27**
47. Victimization - 36 Months	.13**	.12**	.14**	.15**	.18**	.13**	.09**	.18**	.20**	.24**	.23**
48. Victimization - 48 Months	.12**	.13**	.14**	.15**	.17**	.21**	.16**	.21**	.18**	.28**	.23**
49. Victimization - 60 Months	.10**	.06*	.09**	.10**	.12**	.13**	.18**	.19**	.18**	.26**	.19**

(Table cont'd). Note: Black and Hispanic are coded 1 for endorsing the race/ethnicity and 0 for all other individuals.

	45	46	47	48	49
36. Anxiety - 24 Months					
37. Anxiety - 30 Months					
38. Anxiety - 36 Months					
39. Anxiety - 48 Months					
40. Anxiety - 60 Months					
41. Victimization - Baseline					
42. Victimization - 6 Months					
43. Victimization - 12 Months					
44. Victimization - 18 Months					
45. Victimization - 24 Months	1				
46. Victimization - 30 Months	.37**	1			
47. Victimization - 36 Months	.31**	.40**	1		
48. Victimization - 48 Months	.28**	.39**	.37**	1	
49. Victimization - 60 Months	.20**	.22**	.24**	.34**	1

(Table cont'd). Note: Black and Hispanic are coded 1 for endorsing the race/ethnicity and 0 for all other individuals

Test of Main Study Hypotheses

Does antisocial behavior and aggression predict future anxiety and victimization?

The results of the first set of cross-lagged models testing the associations among aggression, antisocial behavior and anxiety, controlling for age, race, and IQ, are presented in Figure 1 and Table 2. In Figure 1, panels with no cross-lagged paths displayed means that the nested model without any cross-lagged paths fit the data best (i.e., stability coefficients and within time correlations only). Panels with both cross-lagged paths displayed (even if the paths were not significant) means that this nested model fit the data best. Panels with only one direction displayed means that those nested models fit the data best. All final models showed excellent fit as depicted by RMSEA values ranging from 0 - .046, SRMR values ranging from 0 - .008, CFI values ranging from .997 – 1.0, and TFI values ranging from .962 – 1.01 (Table 2). Significant paths are depicted with a solid line, non-significant paths are depicted with a dashed line, and standardized coefficients are reported. As shown in Figure 1, the stability paths showing the correlations across one year were significant for all variables (*B*s = .43 - .63, *p*s < .001), suggesting moderate to high levels of stability of aggression, antisocial behavior, and anxiety. As hypothesized and depicted in Figure 1a, aggression predicted increases in future anxiety (*B*s = .08 - .17, *p*s < .001) more consistently across the panels than anxiety predicted future aggression, especially in the early cohorts. Similarly, as hypothesized and depicted in Figure 1b, antisocial behavior also predicted future anxiety more consistently across more follow up periods (*B*s = .09 - .12, *p*s < .001), than anxiety predicted future antisocial behavior (Figure 1b). Again, this was largely due to significant paths over the first three-year follow-up periods.

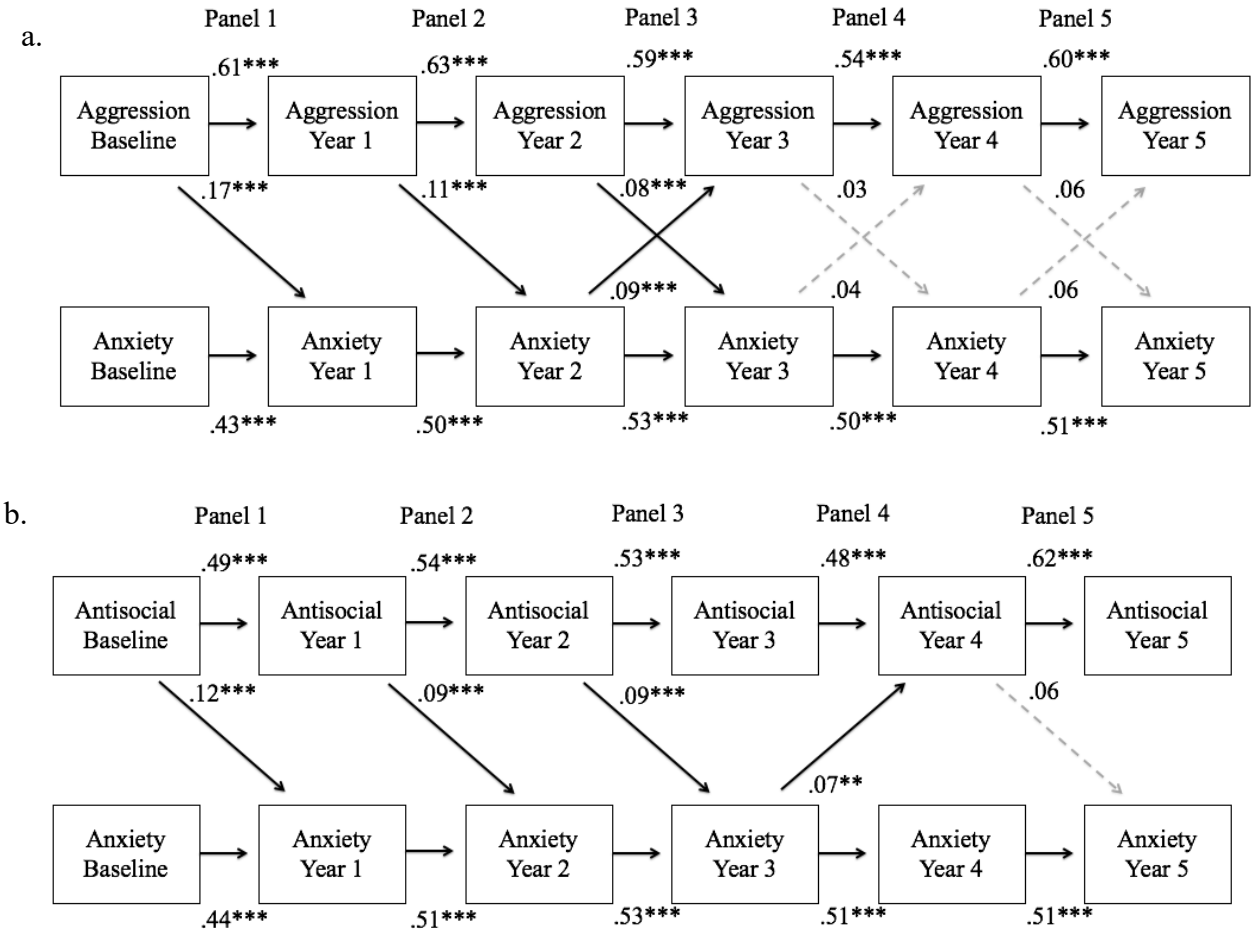

Figure 1. Multiple panel cross-lagged path models of anxiety and aggression (a) and anxiety and antisocial behavior (b). Note: Standardized coefficients are reported. All models control for age, race, and IQ. Panels with no cross-lagged paths displayed means that the nested model without any cross-lagged paths fit the data best (i.e., stability coefficients and within time correlations only). Panels with both cross-lagged paths displayed (even if the paths were not significant) means that this nested model fit the data best. Panels with only one direction displayed means that those nested models fit the data best. All final models showed excellent fit as depicted by RMSEA values ranging from 0 - .046, SRMR values ranging from 0 - .008, CFI values ranging from .997 - 1, and TFI values ranging from .962 – 1.01 (Table 2).

Next, we assessed the reciprocal relationship between aggression, antisocial behavior, and victimization. Again, all final models showed excellent fit as depicted by RMSEA values ranging from 0 - .029, SRMR values ranging from 0 - .009, CFI values ranging from .997 - 1, and TFI values ranging from .98 – 1.01 (Table 2). The stability paths for victimization were again all significant, although they were not as strong as for other variables (Bs = .13 – .38 *p*s <

.001). As hypothesized and depicted in Figure 2a, aggression predicted increased future victimization more consistently (4 of 5 panels) across follow up periods (Bs = .08 - .13, ps < .01), than victimization predicted future aggression. Similarly, as hypothesized and depicted in Figure 2b, antisocial behavior predicted future levels of victimization more consistently across more follow up periods (*B*s = .11 - .21, *p*s < .001) than victimization predicted future antisocial behavior.

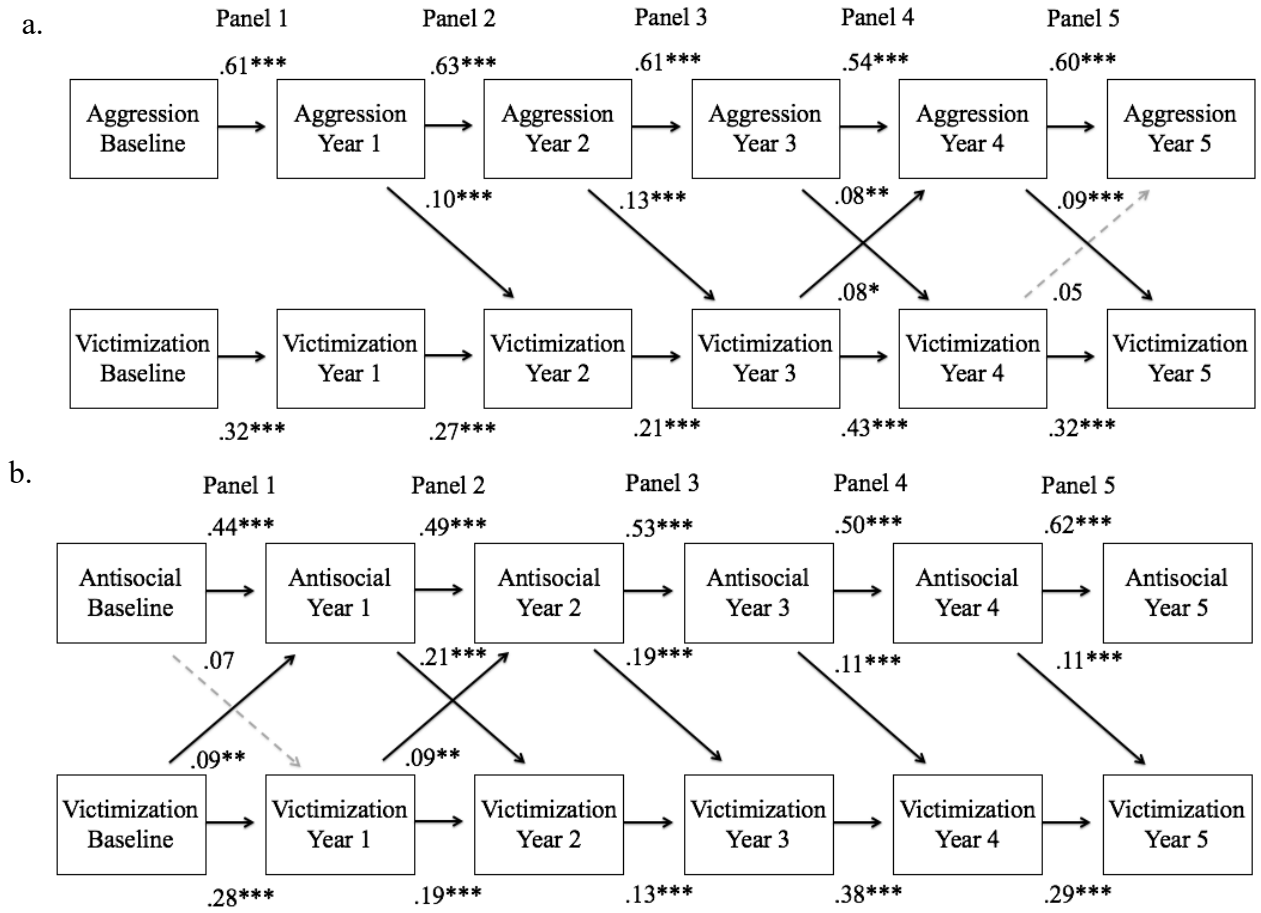

Figure 2. Multiple panel cross-lagged path models of victimization and aggression (a) and victimization and antisocial behavior (b). Note: Standardized coefficients are reported. All models control for age, race, and IQ. Panels with no cross-lagged paths displayed means that the nested model without any cross-lagged paths fit the data best (i.e., stability coefficients and within time correlations only). Panels with both cross-lagged paths displayed (even if the paths were not significant) means that this nested model fit the data best. Panels with only one direction displayed means that those nested models fit the data best. All final models showed excellent fit as depicted by RMSEA values ranging from 0 - .029, SRMR values ranging from 0 - .009, CFI values ranging from .997 - 1, and TFI values ranging from .98 – 1.01 (Table 2).

Table 2. Multiple panel cross-lagged model fit statistics.

	RMSEA	SRMR	CFI	TFI
Aggression and Anxiety				
Panel 1 (Baseline to Year 1)	0.000	0.002	1.000	1.011
Panel 2 (Year 1 to Year 2)	0.037	0.006	0.999	0.981
Panel 3 (Year 2 to Year 3)	0	0	1	1
Panel 4 (Year 3 to Year 4)	0	0	1	1
Panel 5 (Year 4 to Year 5)	0	0	1	1
Antisocial Behavior and Anxiety				
Panel 1 (Baseline to Year 1)	0	0.004	1	1.002
Panel 2 (Year 1 to Year 2)	0.046	0.008	0.997	0.962
Panel 3 (Year 2 to Year 3)	0.02	0.005	0.999	0.993
Panel 4 (Year 3 to Year 4)	0.023	0.005	0.999	0.99
Panel 5 (Year 4 to Year 5)	0	0.002	1	1.007
Aggression and Victimization				
Panel 1 (Baseline to Year 1)	0.029	0.009	0.997	0.983
Panel 2 (Year 1 to Year 2)	0.023	0.004	0.999	0.989
Panel 3 (Year 2 to Year 3)	0	0	1	1.01
Panel 4 (Year 3 to Year 4)	0	0	1	1
Panel 5 (Year 4 to Year 5)	0	0	1	1
Antisocial Behavior and Victimization				
Panel 1 (Baseline to Year 1)	0	0	1	1
Panel 2 (Year 1 to Year 2)	0	0	1	1
Panel 3 (Year 2 to Year 3)	0	0.003	1	1.001
Panel 4 (Year 3 to Year 4)	0	0.001	1	1.014
Panel 5 (Year 4 to Year 5)	0	0.001	1	1.014
CU Traits and Anxiety				
Panel 1 (Baseline to Year 1)	0	0.002	1	1.01
Panel 2 (Year 1 to Year 2)	0	0	1	1
Panel 3 (Year 2 to Year 3)	0	0	1	1
Panel 4 (Year 3 to Year 4)	0	.001	1	1.01
Panel 5 (Year 4 to Year 5)	0	.004	1	1.007
CU Traits and Victimization				
Panel 1 (Baseline to Year 1)	0.019	0.008	0.999	0.992
Panel 2 (Year 1 to Year 2)	0.014	.004	.996	1
Panel 3 (Year 2 to Year 3)	0	0	1	1.009
Panel 4 (Year 3 to Year 4)	0	0	1	1
Panel 5 (Year 4 to Year 5)	0.032	0.009	0.997	0.981

Note: RMSEA = Root Mean Square Error of Approximation. SRMR = Standardized Root Mean Square Residual. CFI = Comparative Fit Index. TFI = Tucker-Lewis Index.

Does CU traits predict future anxiety and victimization? To test the second hypothesis that CU traits more strongly predicts increases in future anxiety and victimization than vice versa, we ran two additional multi-panel cross-lagged models. Again, all final models showed excellent fit as depicted by RMSEA values ranging from 0 - .03, SRMR values ranging from 0 - .01, CFI values ranging from .996 - 1, and TFI values ranging from .981 – 1.01 (Table 2). Again, the stability paths for CU traits were all significant (*B*s = .57 - .66, *p*s < .01). As hypothesized and depicted in Figure 3a, CU traits predicted increases in future anxiety more consistently (4 of 5 panels) across follow up periods (*B*s = .06 - .13, *p*s < .01) than anxiety predicted future CU traits. Lastly, CU traits predicted increased future victimization (*B*s = .08, *p*s < .01) more consistently (2 of 5 panels) across follow up periods (*B*s = .07 - .08, *p*s < .01) than victimization predicted future CU traits.

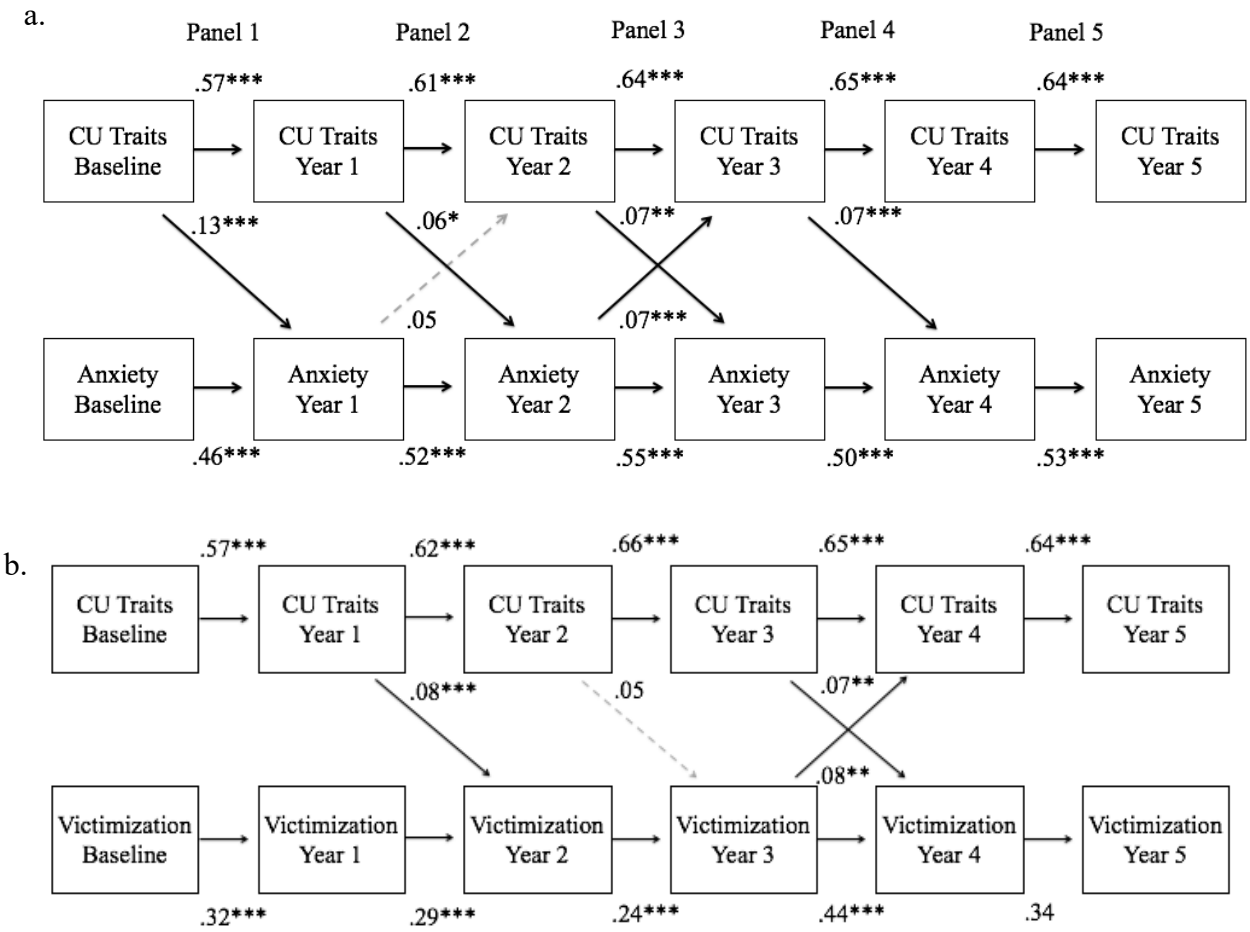

Figure 3. Multiple panel cross-lagged path models of CU traits and anxiety (a) and CU traits and victimization (b). Note: Standardized coefficients are reported. All models control for age, race, and IQ. Panels with no cross-lagged paths displayed means that the nested model without any cross-lagged paths fit the data best (i.e., (i.e., stability coefficients and within time correlations only). Panels with both cross-lagged paths displayed (even if the paths were not significant) means that this nested model fit the data best. Panels with only one direction displayed means that those nested models fit the data best. All final models showed excellent fit as depicted by RMSEA values ranging from 0 - .07, SRMR values ranging from 0 - .02, CFI values ranging from .986 - 1, and TFI values ranging from .911 – 1.01 (Table 2).

Does antisocial behavior and aggression mediate the relationship between CU traits and future anxiety and victimization? To test the third hypothesis that antisocial behavior and aggression mediate the relationship between CU traits and future anxiety and victimization, a series of longitudinal parallel mediation analyses were conducted. As can be seen in Figure 4a-c and Table 3, aggression and antisocial behavior fully or partially mediated the relationship

between CU traits and future anxiety across three of the four time points. The one exception was that the relationship between CU traits at year 3 and anxiety at year 5 was not mediated by antisocial behavior or aggression at year 4. As depicted in Table 3, indirect effects through antisocial behavior and aggression accounted for between 54% to 100% of the total effects across panels. This was largely due to aggression which accounted for between 27% and 65% of the indirect effects across models.

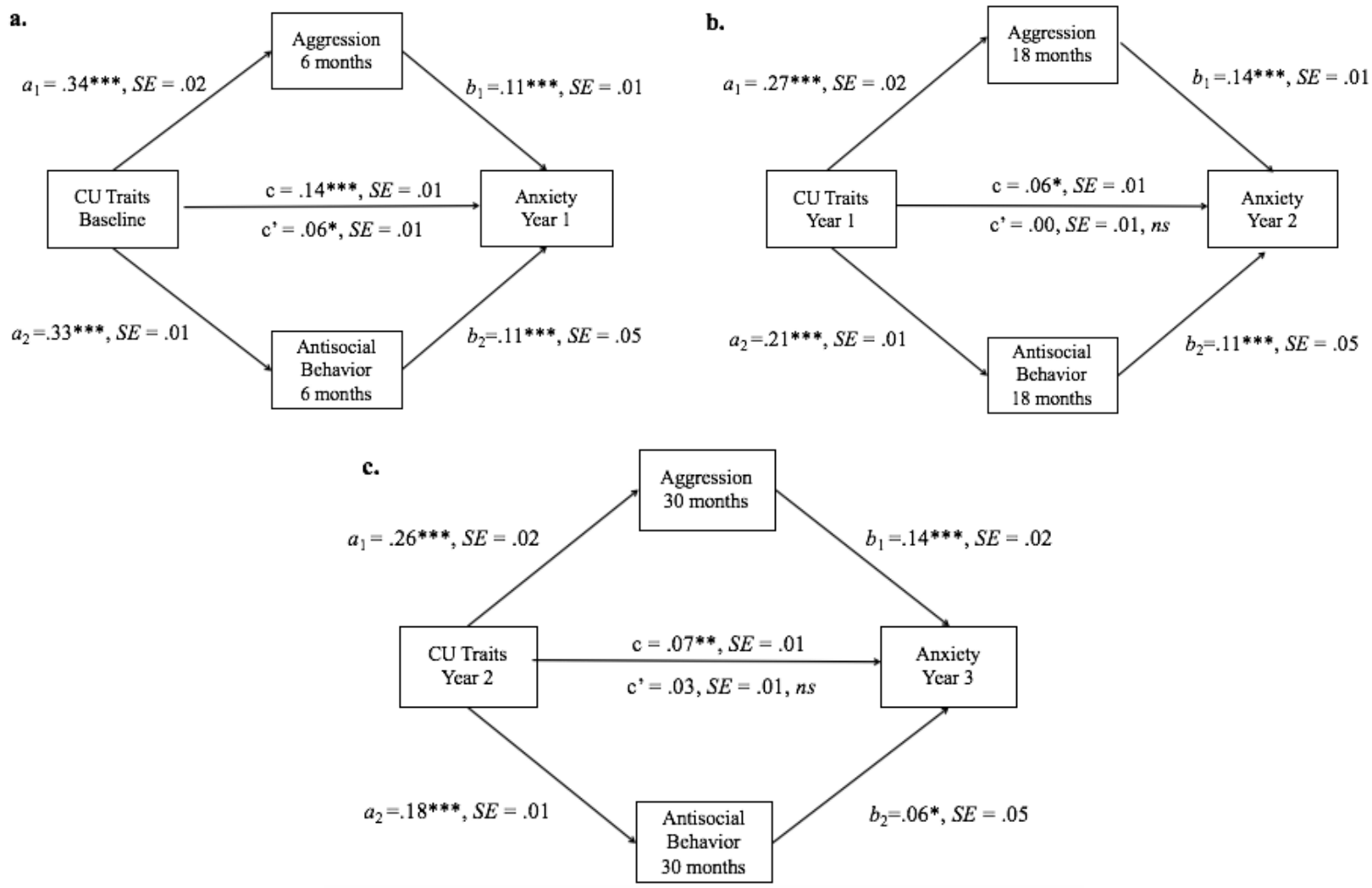

Figure 4. The mediating role aggression and antisocial behavior has on the relationship between CU traits and future anxiety across 5 years. Note. Standardized coefficients are reported. All models control for age, race/ethnicity, and IQ.

Table 3. Total, direct, and indirect effects of the relationship between CU traits predicting future anxiety across time as mediated by aggression and antisocial behavior.

	b	SE	CI	*t*	*p*	Proportion of total effect
CU Traits (Baseline) → Anxiety (Year 1)						
Total Effect	.060	.011	.038, .082	5.392	.001	
Direct Effect	.028	.012	.004, .051	2.301	.022	.46
Total Indirect Effect	.033	[a] .007	[b] .020, .046			.54
Aggression (6 months)	.016	[a] .006	[b] .005, .028			.27
Antisocial Behavior (6 months)	.016	[a] .005	[b] .006, .027			.27
CU Traits (Year 1) → Anxiety (Year 2)						
Total Effect	.026	.011	.005, .047	2.47	.014	
Direct Effect	.000	.011	-.021, .021	-.003	.998	0
Total Indirect Effect	.026	[a] .005	[b] .017, .037			1
Aggression (18 months)	.017	[a] .004	[b] .009, .026			.65
Antisocial Behavior (18 months)	.01	[a] .004	[b] .003, .018			.38
CU Traits (Year 2) → Anxiety (Year 3)						
Total Effect	.035	.012	.012, .058	3.018	.003	
Direct Effect	.013	.012	-.011, .036	1.068	.286	.37
Total Indirect Effect	.022	[a] .005	[b] .013, .031			.63
Aggression (30 months)	.017	[a] .004	[b] .008, .025			.49
Antisocial Behavior (30 months)	.005	[a] .003	[b] .001, .010			.14
CU Traits (Year 3) → Anxiety (Year 5)						
Total Effect	.016	.012	-.008, .039	1.307	.1914	

Note: Unstandardized coefficients reported. [a] Bootstrapped Standard Errors using 5,000 samples. [b] Bootstrapped Confidence Intervals. All models control for age, race, and IQ.

Next, these analyses were repeated to test whether aggression and antisocial behavior mediated the relationship between CU traits and victimization. As seen in Figure 5a-b and Table 4, antisocial behavior, but not aggression, fully mediated the relationship between CU traits and future victimization across two of the four follow up points. As depicted in Table 4, the total effect models of CU traits accounted for between 10%-15% of the variance in victimization. Of this, 20% of the variance in victimization was account for by CU traits, with 80% of this total effect being account for by indirect effects through aggression and antisocial behavior. This was largely due to antisocial behavior which accounted for between 40% and 80% of the indirect effects across models.

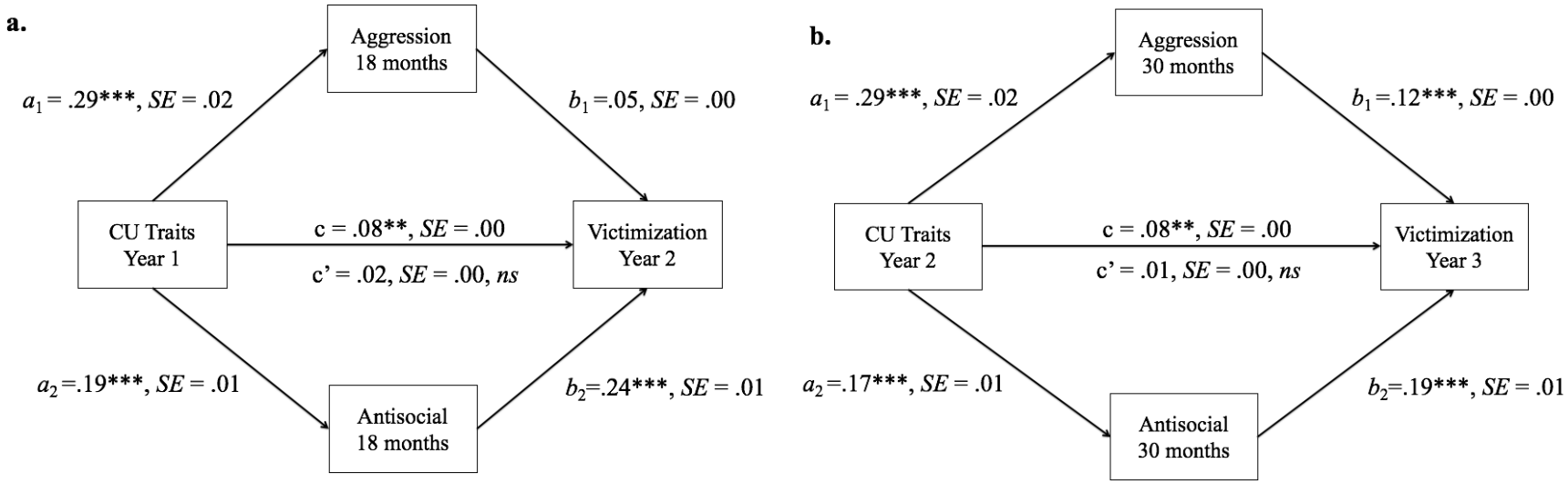

Figure 5. The mediating role aggression and antisocial behavior has on the relationship between CU traits and future victimization across 5 years. Note. Standardized coefficients are reported. All models control for age, race/ethnicity, and IQ.

Table 4. Total, direct, and indirect effects of the relationship between CU traits predicting future victimization across time as mediated by aggression and antisocial behavior.

	b	SE	CI	*t*	*p*	Proportion of total effect
CU Traits (Baseline) → Victimization (Year 1)						
Total Effect	.003	.002	-.001, .008	1.488	.1370	
CU Traits (Year 1) → Victimization (Year 2)						
Total Effect	.005	.002	.002, .009	2.792	.005	
Direct Effect	.001	.002	-.002, .005	.653	.5138	.20
Total Indirect Effect	.004	[a] .001	[b] .002, .006			.80
Aggression (18 months)	.001	[a] .001	[b] -.001, .003			.20
Antisocial Behavior (18 months)	.003	[a] .001	[b] .001, .005			.80
CU Traits (Year 2) → Victimization (Year 3)						
Total Effect	.005	.002	.002, .008	2.795	.005	
Direct Effect	.001	.002	-.003, .004	.331	.741	.20
Total Indirect Effect	.004	[a] .001	[b] .002, .007			.80
Aggression (30 months)	.002	[a] .001	[b] .000, .005			.40
Antisocial Behavior (30 months)	.002	[a] .001	[b] .001, .004			.40
CU Traits (Year 3) → Victimization (Year 5)						
Total Effect	.001	.002	-.003, .004	.245	.807	

Note: Unstandardized coefficients reported. [a] Bootstrapped Standard Errors using 5,000 samples. [b] Bootstrapped Confidence Intervals. All models control for age, race, and IQ.

Chapter 4. Discussion

The current study sought to disentangle the bidirectional relationship among CU traits, externalizing behaviors (e.g., aggression, antisocial behavior), anxiety, and trauma exposure (e.g., victimization). We tested the predictions from a theory proposing that anxiety and victimization are largely the *consequence* of an adolescent's antisocial and aggressive behavior and that these externalizing problems explain the link between CU traits with both anxiety and victimization. This is in contrast to theories that propose anxiety and victimization increase children and adolescents' risk for aggression, antisocial behavior, and CU traits over time.

Using a longitudinal design and multi-panel cross lagged models, our first aim sought to assess the reciprocal relationship between aggression, antisocial behavior, anxiety, and victimization. In support of our hypotheses, we found that aggression and antisocial behavior predicted both future anxiety and victimization more consistently than anxiety and victimization predicted future aggression and antisocial behavior, even after controlling for age, race, and IQ. This is consistent with previous work suggesting that adolescents with serious conduct problems elicit negative consequences, such as peer or parental rejection, poor academic performance, or legal trouble that may increase internalizing symptoms (Burke et al., 2005; Campbell et al., 2006; Frick et al., 1999; Lahey et al., 2002; Masten et al., 2005; Moilanen et al., 2010; Nock et al. 2007; Stipek & Miles, 2008; van Lier et al., 2012). Further, these results are also consistent with the literature suggesting that antisocial and aggressive youths may put themselves into situations that may increase their risk for being victimized (Burke et al., 2008; Button et al., 2007; Edwards et al., 2001; Fontaine et al., 2016; Ford 2002; Ford et al., 2000; Huh et al., 2006; McLaughlin et al., 2013; Pardini et al., 2008; Pouwels & Chillessen, 2012).

Next, our second aim sought to assess the reciprocal relationship between CU traits, anxiety, and victimization across time. Consistent with our hypothesis, CU traits predicted increases in future anxiety more consistently than anxiety predicted future CU traits. Further, CU traits also predicted future victimization more consistently than victimization predicted future CU traits. These results are critical because they are not consistent with theories that argue for an etiological difference between primary and secondary CU variants in children (and psychopathy variants in adults). That is, among those with elevated CU traits, some children show significant levels of anxiety (i.e., secondary variant) who also display significantly higher levels of victimization and externalizing symptoms compared to those with normative levels of anxiety (i.e., primary variant). For decades this has been interpreted as being indicative of a unique causal pathway to CU traits, such that CU traits are 'acquired' due to significant trauma exposure (Bennett & Kerig, 2014; Kerig & Becker, 2010; Kerig et al., 2012; Kimonis et al., 2012; Mozley et al., 2018; Porter, 1996; Skeem et al., 2007; Skeem et al., 2003). However, our results suggest an alternative explanation; namely, CU traits may lead to more anxiety and victimization rather than anxiety and victimization predicting future CU traits. Of note, while both anxiety and victimization did predict future CU traits across one follow up period, it was only after several waves of CU traits predicting future anxiety and victimization.

Lastly, our third aim sought to test a potential reason for why CU traits may lead to increases in anxiety and victimization. That is, we tested whether the relationship between CU traits, anxiety, and victimization was accounted for by the adolescents' level of externalizing behavior problems. Using longitudinal parallel mediation analyses, both aggression and antisocial behavior mediated the relationship between CU traits and future anxiety across three of the four follow up periods. Critically, the indirect effects through aggression and antisocial

behavior accounted for a significant portion of the total effect (i.e., 54-100%). These results suggest adolescents with high levels of CU traits show increases in anxiety over time largely as a consequences of their aggressive and antisocial behavior (Burke et al., 2005; Campbell et al., 2006; Frick et al., 1999; Lahey et al., 2002; Masten et al., 2005; Moilanen et al., 2010; Nock et al. 2007; Stipek & Miles, 2008; van Lier et al., 2012). In addition, we also found that antisocial behavior, but not aggression, mediated the relationship between CU traits and future victimization across two of the four time periods, accounting for 10-15% variance of victimization. That is, adolescents with high levels of CU traits showed increased risk for being victimized due to their engagement in frequent antisocial behavior, such as fighting, theft, and drug use.

The current study has important treatment implications for children and adolescents with serious conduct problems. First, in order to prevent the development of anxiety and risk of victimization among children and adolescents with conduct problems, mental health professionals should focus their efforts on reducing the youths' aggressive and antisocial behaviors, rather than necessarily directly trying to reduce the youths' anxiety. Further, when an adolescent exhibits conduct problems, anxiety, and has a history of victimization, mental health professionals are likely to see reductions in all symptoms by targeting the primary symptoms (e.g., conduct problems). Once the youth experiences trauma, even if this is caused by his or her own behavior, the youth may still need to receive interventions that consider the effects of trauma (Mozley et al., 2018; Kerig & Modrowski, 2018). However, our data suggest that focusing solely on trauma exposure or internalizing symptoms may be limited in its effectiveness if a reduction in the adolescent's conduct problems are not successful.

An important methodological advance of the current study is the extended follow-up period using five years of data. This methodology was important as it allowed us to use autoregressive cross-lagged panel models which provides a stronger test of the temporal relationship between externalizing symptoms, anxiety, and victimization. That is, these analyses allowed us to test the longitudinal relationship between aggression, antisocial behavior, CU traits, anxiety and victimization over multiple time periods, while simultaneously accounting for their correlational relationship across time. This is important because much of the past research has been cross-sectional (Garland & Garland, 2001; Marmorstein, 2007; Marsee et al., 2008; Sullivan et al., 2006) or have only considered one direction when assessing the relationship between these constructs over time (e.g., anxiety predicting future aggression, victimization predicting future aggression; Dauvergne & Johnson, 2001; Garai et al., 2009; Goodearl et al., 2014; Gorman-Smith et al., 2004). Further, no research has assessed the longitudinal relationship between CU traits, anxiety, and victimization to test the proposed theories on the etiological differences between primary and secondary CU variants.

An additional question remains surrounding why primary and secondary CU variants sometimes show distinct profiles in emotional reactivity. That is, it still remains unclear as to why those with high CU traits and low anxiety exhibit *hypo*reactive responses to emotionally salient stimuli (Kimonis et al., 2012) and show reduced amygdala activation to fear or distress cues (Marsh et al., 2008; White et al., 2012) while those with high CU traits and high anxiety exhibit *hyper*reactive responses to emotional images (Kimonis et al., 2017) and show greater distress (Bennett & Kerig, 2014; Craig & Moretti, 2019; Gill & Stickle, 2016; Goulter et al., 2019; Salihovic et al., 2014; Sharf et al., 2014). One explanation is that once a child or adolescent with high CU traits develops anxiety, cognitive processes associated with attending to

and evaluating emotional stimuli (e.g., fear faces, threat cues) may be altered and affect performance on these tasks (Lake et al., 2011). Relatedly, we know trauma exposure significantly alters neural networks associated with conditioning, as well as attending to and evaluating threat and social information (McLaughlin & Lambert, 2017; McLaughlin et al., 2016; McLaughlin et al., 2017). Thus, it is possible the trauma exposure and anxiety reported by those with elevated CU traits are also influencing the neural networks in these youths, increasing their responding to social and emotionally evocative stimuli.

Our results are also consistent with the frequent finding of suppressor effects when studying the associations among CU traits, anxiety, and externalizing behavior. That is, CU traits are often either uncorrelated or positively correlated with anxiety until conduct problems are controlled for, at which point the correlation becomes negative (Frick, 2012; Frick et al., 1999). Our results suggest that anxiety and conduct problems are highly correlated. Also, the majority of children and adolescents with elevated CU traits show significant conduct problems and aggression. Thus, as a result, CU traits are positively associated with anxiety. However, the suppressor effects suggest that given the *same level* of conduct problems, those high on CU traits may be less distressed or anxious compared to those low on CU traits.

The results of the current study need to be interpreted in light of some important limitations. First, while all analyses controlled for age, race, and IQ, they did not account for additional characteristics of the adolescent that may increase or decrease risk of externalizing behavior problems, anxiety, or victimization. For example, associating with delinquent peers is one of the strongest predictors of antisocial behavior (Hoeben et al., 2016), and those with elevated CU traits have been found to associate with delinquent peers more so than adolescents with normative levels of CU traits (Thornton et al., 2016; Ray et al., 2017). Thus, it is possible

that there may be other mediators, such as level of delinquent peer affiliation, that account for some of the variance in the association between CU traits and anxiety or between CU traits and victimization. Similarly, parental warmth and monitoring have been found to reduce CU traits and moderate the relationship between CU traits and externalizing behavior problems in samples of children and adolescents (Clark & Frick, 2018; Pasalich et al., 2011). Such parenting could also play a role in minimizing the negative effects of being victimized (Bacchini, Miranda, & Affuso, 2011). Thus, it is possible that the relationship between CU traits, externalizing behavior problems, and victimization may change when accounting for parental warmth or monitoring. It will be important for future research to assess how these interpersonal and contextual characteristics may influence the relationship between these variables and how they may moderate the development of future anxiety and victimization as consequences of serious conduct problems.

An additional limitation of the current study was that it was limited to boys and thus it is unclear if our findings generalize to girls. This is an especially notable limitation, given that girls and boys show differences in their level of CU traits (Frick, Bodin, & Barry, 2000), aggression and antisocial behavior (Burt, 2012; Crapenzano, Frick, Terranova, 2010), type of victimization (de Waal et al., 2017), responses to victimization (McLaughlin et al., 2013), and rate of anxiety disorders (Merikangas et al., 2010). Given that boys show higher rates of aggression and violence and are at a higher risk of physical victimization compared to girls, it is possible boys elicit or select themselves into situations that lead to physical victimization more so than girls do. However, girls show higher levels of anxiety disorders (Merikangas et al., 2010) and higher levels of posttraumatic stress disorder after being victimized than boys (McLaughlin et al., 2013). Thus, future research should study the longitudinal reciprocal relationship between

externalizing behavior problems, CU traits, victimization, and anxiety in samples of girls, to see if our findings replicate across sex. Further, our sample consisted of adolescents who were arrested for the first time for a low to moderately severe crime and thus, it is unclear whether these results would replicate in more severe adolescent offenders. Lastly, the current study consisted of adolescents, who were on average 15 years of age at baseline and on average 20 years of age at the year 5 time point. Thus, many of the associations of interest were already present at the start of the study. Additional work is needed at earlier developmental stages when these associations are first emerging. However, similar findings were found by Fanti and colleagues (2019) who reported a study of over 2,000 children ages 3-5 and followed for five years. Using autoregressive cross-lagged models, they reported that conduct problems at ages 3-5 predicted depression at age 4-6, and conduct problems at ages 5-7 predicted anxiety at ages 8-10. Importantly, both anxiety and depression did not predict future conduct problems. Thus, there is some evidence that our results would replicate in younger children. However, Fanti et al (2019) did not measure victimization or CU traits.

Within the context of these limitations, our findings support the theory that anxiety and victimization are largely the consequence of an adolescent's antisocial and aggressive behavior and that these externalizing problems explain the link between CU traits with both anxiety and victimization. This suggests that anxiety may be a *marker of the severity* of conduct problems in youths with elevated CU traits, rather than being a marker for distinct etiological pathways among primary and secondary CU variants. Clinically, our findings suggest reducing adolescents' serious conduct problems is one method of preventing both anxiety and trauma exposure in these youths.

Appendix A. Inventory of Callous-Unemotional Traits

Please listen carefully to each statement and decide how well it describes you. Choose the appropriate answer for each statement.

	Not at all true	Somewhat true	Very true	Definitely true
I express my feelings openly.	(0)	(1)	(2)	(3)
What I think is "right" and "wrong" is different from what other people think.	(0)	(1)	(2)	(3)
I care about how well I do at school or work.	(0)	(1)	(2)	(3)
I do not care who I hurt to get what I want.	(0)	(1)	(2)	(3)
I feel bad or guilty when I do something wrong.	(0)	(1)	(2)	(3)
I do not show my emotions to others.	(0)	(1)	(2)	(3)
I do not care about being on time.	(0)	(1)	(2)	(3)
I am concerned about the feelings of others.	(0)	(1)	(2)	(3)
I do not care if I get into trouble.	(0)	(1)	(2)	(3)
I do not let my feelings control me.	(0)	(1)	(2)	(3)
I do not care about doing things well.	(0)	(1)	(2)	(3)
I seem very cold and uncaring to others.	(0)	(1)	(2)	(3)
I easily admit to being wrong.	(0)	(1)	(2)	(3)
It is easy for others to tell how I am feeling.	(0)	(1)	(2)	(3)
I always try my best.	(0)	(1)	(2)	(3)
I apologize ("say I am sorry") to persons I hurt.	(0)	(1)	(2)	(3)
I try not to hurt others' feelings.	(0)	(1)	(2)	(3)
I do not feel remorseful when I do something wrong.	(0)	(1)	(2)	(3)
I am very expressive and emotional.	(0)	(1)	(2)	(3)
I do not like to put the time into doing things well.	(0)	(1)	(2)	(3)

The feelings of others are unimportant to me.	(0)	(1)	(2)	(3)
I hide my feelings from others.	(0)	(1)	(2)	(3)
I work hard on everything I do.	(0)	(1)	(2)	(3)
I do things to make others feel good.	(0)	(1)	(2)	(3)

Appendix B. Peer Conflict Scale

Please indicate how well each statement describes you.

	Not at all true	Somewhat true	Very true	Definitely true
I have to hurt others to win a game or contest. (PCS01)	(0)	(1)	(2)	(3)
I enjoy making fun of others. (PCS02)	(0)	(1)	(2)	(3)
When I am teased, I will hurt someone or break something. (PCS03)	(0)	(1)	(2)	(3)
I gossip about others when I am angry at them. (PCS04)	(0)	(1)	(2)	(3)
I start fights to get what I want. (PCS05)	(0)	(1)	(2)	(3)
I deliberately exclude others from my group, even if they haven't done anything to me. (PCS06)	(0)	(1)	(2)	(3)
I spread rumors and lies about others when they do something wrong to me. (PCS07)	(0)	(1)	(2)	(3)
When someone hurts me, I end up getting into a fight. (PCS08)	(0)	(1)	(2)	(3)
I try to make others look bad to get what I want. (PCS09)	(0)	(1)	(2)	(3)
When someone upsets me, I tell my friends to stop liking that person. (PCS10)	(0)	(1)	(2)	(3)
I threaten others when they do something wrong to me. (PCS11)	(0)	(1)	(2)	(3)
When I hurt others, it makes me feel powerful and respected. (PCS12)	(0)	(1)	(2)	(3)
I tell others' secrets for things they did to me a while back. (PCS13)	(0)	(1)	(2)	(3)
When someone threatens me, I end up getting into a fight. (PCS14)	(0)	(1)	(2)	(3)
I make new friends to get back at someone who has made me angry. (PCS15)	(0)	(1)	(2)	(3)
I hurt others when I am angry with them. (PCS16)	(0)	(1)	(2)	(3)
When others make me mad, I write mean notes about them and pass the notes around. (PCS17)	(0)	(1)	(2)	(3)
I threaten others to get what I want. (PCS18)	(0)	(1)	(2)	(3)

I gossip about others to become popular. (PCS19)	(0)	(1)	(2)	(3)
If others make me mad, I hurt them. (PCS20)	(0)	(1)	(2)	(3)
I am deliberately cruel to others, even if they haven't done anything to me. (PCS21)	(0)	(1)	(2)	(3)
When I am angry at others, I try to make them look bad. (PCS22)	(0)	(1)	(2)	(3)
To get what I want, I try to steal others' friends from them. (PCS23)	(0)	(1)	(2)	(3)
I carefully plan out how to hurt others. (PCS24)	(0)	(1)	(2)	(3)
When someone makes me mad, I throw things at them. (PCS25)	(0)	(1)	(2)	(3)
When I gossip about others, I feel like it makes me popular. (PCS26)	(0)	(1)	(2)	(3)
I hurt others for things they did to me a while back. (PCS27)	(0)	(1)	(2)	(3)
I enjoy hurting others. (PCS28)	(0)	(1)	(2)	(3)
I spread rumors and lies about others to get what I want. (PCS29)	(0)	(1)	(2)	(3)
When I have gotten into arguments or physical fights, it is usually because I acted without thinking. (PCS30)	(0)	(1)	(2)	(3)
If others make me mad, I tell their secrets. (PCS31)	(0)	(1)	(2)	(3)
I ignore or stop talking to others in order to get them to do what I want. (PCS32)	(0)	(1)	(2)	(3)
I like to hurt kids smaller than me. (PCS33)	(0)	(1)	(2)	(3)
When others make me angry, I try to steal their friends from them. (PCS34)	(0)	(1)	(2)	(3)
I threaten others, even if they haven't done anything to me. (PCS35)	(0)	(1)	(2)	(3)
When I get angry, I will hurt someone. (PCS36)	(0)	(1)	(2)	(3)
I have gotten into fights, even over small insults from others. (PCS37)	(0)	(1)	(2)	(3)
When I have started rumors about someone, it is usually because I acted without thinking. (PCS38)	(0)	(1)	(2)	(3)
I say mean things about others, even if they haven't done anything to me. (PCS39)	(0)	(1)	(2)	(3)

When someone makes me angry, I try to exclude them from my group. (PCS40)	(0)	(1)	(2)	(3)

Appendix C. Self-Report of Offending Scale (SRO)

In the past 12 months, have you….	If yes, how many times have you done this in the past twelve months?	Thinking about the last time you did this, was anyone with you at the time? (1) Yes (5) No	
Purposely destroyed or damaged property that did not belong to you? (1) Yes (5) No			
Purposely set fire to a house, building, car, or vacant lot? (1) Yes (5) No			
Entered or broken into a building to steal something? (1) Yes (5) No			
Stolen something from a store (shoplifted)? (1) Yes (5) No			
Bought, received, or sold something that you knew was stolen? (1) Yes (5) No			
Used checks or credit cards illegally? (1) Yes (5) No			
Stolen a car or motorcycle to keep or sell? (1) Yes (5) No			
Sold marijuana? (SRORow8) (1) Yes (5) No			
Sold other illegal drugs (cocaine, crack, heroine)? (1) Yes (5) No			
Carjacked someone? (1) Yes (5) No			Did you have a gun the last time you did this? (1) Yes (5) No
Driven while you were drunk or high? (1) Yes (5) No			
Been paid by someone for having sexual relationship with them? (1) Yes (5) No			

Forced someone to have sex with you? (1) Yes (5) No			Did you have a gun the last time you did this? (1) Yes (5) No
Killed someone? (1) Yes (5) No			Did you have a gun the last time you did this? (1) Yes (5) No
Shot someone (where bullet hit the victim)? (1) Yes (5) No			
Shot AT someone (where you pulled the trigger)? (1) Yes (5) No			
Taken something from another person by force, using a weapon? (1) Yes (5) No			Did you have a gun the last time you did this? (1) Yes (5) No
Taken something from another person by force, without a weapon? (1) Yes (5) No			
Beaten up or physically attacked someone so badly that they probably needed a doctor? (1) Yes (5) No			
Been in a fight? (1) Yes (5) No			
Beaten up, threatened, or physically attacked someone as part of a gang? (1) Yes (5) No			Did you have a gun the last time you did this? (1) Yes (5) No
Carried a gun? (1) Yes (5) No			
Broken into a car to steal from it? (1) Yes (5) No			
Gone joyriding? (1) Yes (5) No			

Appendix D. Revised Children Anxiety and Depression Scale (RCADS)

Please select the word that shows how often each of these things happen to you. There are no right or wrong answers.

	Never	Sometimes	Often	Always
I worry about things (rcads1)	(1)	(2)	(3)	(4)
I feel sad or empty (rcads2)	(1)	(2)	(3)	(4)
Nothing is much fun anymore (rcads3)	(1)	(2)	(3)	(4)
I have trouble sleeping (rcads4)	(1)	(2)	(3)	(4)
I worry that something awful will happen to someone in my family (rcads5)	(1)	(2)	(3)	(4)
I have problems with my appetite (rcads6)	(1)	(2)	(3)	(4)
I have no energy for things (rcads7)	(1)	(2)	(3)	(4)
I am tired a lot (rcads8)	(1)	(2)	(3)	(4)
I worry that bad things will happen to me (rcads9)	(1)	(2)	(3)	(4)
I cannot think clearly (rcads10)	(1)	(2)	(3)	(4)
I worry that something bad will happen to me (rcads11)	(1)	(2)	(3)	(4)
I feel worthless (rcads12)	(1)	(2)	(3)	(4)
I worry about what is going to happen (rcads13)	(1)	(2)	(3)	(4)
I think about death (rcads14)	(1)	(2)	(3)	(4)
I feel like I don’t want to move (rcads15)	(1)	(2)	(3)	(4)
I worry when I go to bed at night (rcads16)	(1)	(2)	(3)	(4)
I feel restless (rcads17)	(1)	(2)	(3)	(4)

Appendix E. Exposure to Violence Scale (ETV)

In the past twelve months, have you…	**How many times has this happened in the past twelve months?**	**When was the last time this happened?** (Only ask if it happened in the past 6 months) (EV0f)	**Was this to get back at you for something you did?**
Been chased where you thought you might be seriously hurt? *Interviewer: Include only times when the subject was chased by a person, not an animal* (1) Yes (5) No		(1) Within the past 30 days (2) 1-3 months ago (3) 4-6 months ago (4) More than 6 months ago	(1) Yes (5) No
Been beaten up, mugged, or seriously threatened by another person? (1) Yes (5) No		(1) Within the past 30 days (2) 1-3 months ago (3) 4-6 months ago (4) More than 6 months ago	(1) Yes (5) No

In the past twelve months, have you been raped, had someone attempt to rape you or been sexually attacked in some other way?

(1) Yes
(5) No

If Yes:

Has this happened more than one time?
(1) Yes
(5) No

When was the last time this happened?
(1) Within the past 6 months
(2) Within the past year
(3) More than a year ago

How is the person that did this related to you?
(1) Family member
(2) Friend/acquaintance
(3) Stranger

Where did this happen?
(1) Home
(2) School
(3) Neighborhood
(6) Other: _____

In the past twelve months, have you…	**How many times has this happened?** (EV0e)	**When was the last time this happened? (Only ask if it happened in the past 6 months)** (EV0f)	**Was this to get back at you for something you did?**
Been attacked with a weapon, like a knife, box cutter, or bat? (1) Yes (5) No		(1) Within the past 30 days (2) 1-3 months ago (3) 4-6 months ago (4) More than 6 months ago	(1) Yes (5) No
Been shot at? *Interviewer: Does not include being shot, just shot AT* (1) Yes (5) No		(1) Within the past 30 days (2) 1-3 months ago (3) 4-6 months ago (4) More than 6 months ago	(1) Yes (5) No
Been shot? (1) Yes (5) No		(1) Within the past 30 days (2) 1-3 months ago (3) 4-6 months ago (4) More than 6 months ago	(1) Yes (5) No
Seen someone else get chased where you thought they could be seriously hurt? *Interviewer: Include only times when the subject was chased by a person, not an animal* (1) Yes (5) No		(1) Within the past 30 days (2) 1-3 months ago (3) 4-6 months ago (4) More than 6 months ago	
Seen someone else get beaten up, mugged, or seriously threatened by another person? (1) Yes (5) No		(1) Within the past 30 days (2) 1-3 months ago (3) 4-6 months ago	

		(4) More than 6 months ago
Seen someone else being raped, an attempt made to rape someone, or any other type of sexual attack? (1) Yes (5) No		(1) Within the past 30 days (2) 1-3 months ago (3) 4-6 months ago (4) More than 6 months ago
Seen someone else get attacked with a weapon, like a knife, box cutter, bat, chain, or broken bottle? (1) Yes (5) No		(1) Within the past 30 days (2) 1-3 months ago (3) 4-6 months ago (4) More than 6 months ago
Seen someone else get shot at? (1) Yes (5) No		(1) Within the past 30 days (2) 1-3 months ago (3) 4-6 months ago (4) More than 6 months ago
Seen someone else get shot? (1) Yes (5) No		(1) Within the past 30 days (2) 1-3 months ago (3) 4-6 months ago (4) More than 6 months ago
Seen someone else get killed as a result of violence, like being shot, stabbed, or beaten to death? (1) Yes (5) No		(1) Within the past 30 days (2) 1-3 months ago (3) 4-6 months ago (4) More than 6 months ago

Appendix F. IRB Approval

ACTION ON PROTOCOL CONTINUATION REQUEST

Institutional Review Board
Dr. Dennis Landin, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu | lsu.edu/irb

TO: Paul Frick
Psychology

FROM: Dennis Landin
Chair, Institutional Review Board

DATE: October 4, 2016

RE: **IRB#** 3650

TITLE: Crossroads: Formal versus informal processing in the juvenile justice system

New Protocol/Modification/Continuation: Continuation

Review type: Full ___ Expedited _X_ **Review date:** 10/4/2016

Risk Factor: Minimal ___X___ Uncertain _____ Greater Than Minimal_____

Approved_____X_____ **Disapproved**_____

Approval Date: 10/4/2016 **Approval Expiration Date:** 10/3/2017

Re-review frequency: (annual unless otherwise stated)

Number of subjects approved: 151

LSU Proposal Number (if applicable): 43721

Protocol Matches Scope of Work in Grant proposal: (if applicable) Yes

By: Dennis Landin, Chairman _____

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –
Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. **SPECIAL NOTE: Make sure to use bcc when emailing more than one recipient.**

**All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.lsu.edu/irb*

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Vita

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